AMERICAN MACHINIST

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ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

Improved 16-Inch Screw-Cutting Engine Lathe.

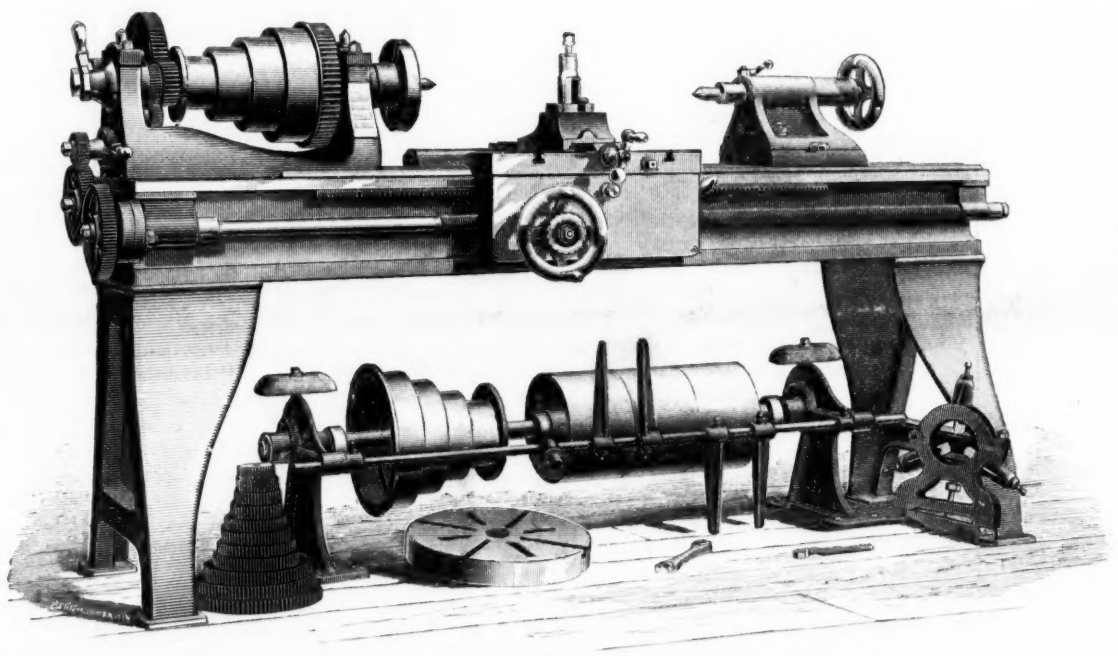
The lathe shown in the engraving is built by the Muller Machine Tool Company, Cincinnati, Ohio. It is a heavy tool calculated for hard work, and at the same time is made to be handled conveniently and quickly.

The spindle, of hammered steel, has a $\frac{3}{4}''$ hole through it, to provide for working long stock; the front bearing is $2\frac{1}{2}''$ in diameter and $4\frac{1}{4}''$ in length; the boxes of hard bronze with bearings ground true. The feed is by means of a friction driven from a slot in the screw, not from the thread, which is preserved for screw cutting. The apron is double, which permits all feed gears to be mounted on shafts having bearings at each of their ends.

The carriage has bearings on V's its entire length and is gibbed both front and back. Bearing surfaces fitted by scraping, no filing or emery grinding.

The lathe with gears ordinarily furnished, cuts threads from 3 to 24 to the inch; it has power cross-feed, center rest, two face plates, wrenches and countershaft; countershaft has three pulleys, for 3″ belt. The cone pulleys are for $2\frac{1}{2}''$ belt.

Beds are made of any desired length. The one shown in engraving is 6′ long, and will turn 2′ 8″ in length. The swing-over bed is 16″, swing-over rest 10″, weight 1,600 lbs.



16-Inch Engine Lathe.

The Minneapolis Industrial Exposition.

Visitors to Minneapolis will notice as the railroad train approaches the Union depot, a large and magnificent building of pink Mankato stone, red brick and terra cotta, standing on high ground and overlooking the Falls of St. Anthony, and the most extensive flour mills in the world.

Less than four months ago the site of this attractive building was bare; now it is covered by a permanent exposition building 360x366 feet, with a tower running up 240 feet, and fronted by beautiful grassy terraces and flower beds.

Architecturally considered, it is one of the very finest exhibition buildings ever erected in this country, and the wonder is that it could have been begun and finished in so short a time. But this rapid progress and enterprise is typical of the people of Minneapolis, a city with less than 47,000 people in 1880, which has added nearly or quite 100,000 to its population since the census of that year.

We are thus particular in mentioning the attractive exterior of the building, because it indicates something of the appearance of things inside, where the first Minneapolis Industrial Exposition is now going on, and because the immediate surroundings of some exposition buildings have been rather disagreeable.

The exposition opened August 23, and will close October 2. Over 900 exhibitors have been allotted space, and there is no room for more. They represent every section of the country.

Machinery in motion is one of the main attractions. The Atlas Engine Works, of Indianapolis, have a pair of large engines and a single engine driving the main shafting, also four other engines in place for operation. The Buckeye Engine Company, of Salem, O., have a 13″x24″ engine also driving a line of shafting. Russell & Co., of Massillon, O., have one of their new high-speed engines driving a dynamo with 65 arc lights on the circuit. The same firm also show one of their traction engines. The Paige Manufacturing Company, of Painesville, O., have a small engine running. The Prospect Engine Company, of Cleveland, show one of their Cummer engines. The North Star Iron Works, of Minneapolis, will have one of their high-speed engines in place soon. The Ide engines are shown by H. L. Ide & Son. All of the above mentioned engines are horizontal. Vertical engines are conspicuous by their absence. All the engines exhaust into a pipe under the floor, which leads to a heater in the boiler room. Heine safety boilers from St. Louis, furnish the steam.

The Gordon & Maxwell Manufacturing Company, of Hamilton, O., show a pair of their duplex water-works pumps. The plate gives the size 16″x12″x20″. Worthington duplex steam pumps are also placed on exhibition. The Pray Manufacturing Company, of Minneapolis, have a large exhibit of steam engines, saw and flour mill machinery. The Link Belt Machinery Company, of Chicago, have a good display of their conveying apparatus Beaudry & Cunningham, of Boston, show their cushioned helve hammers. The Phoenix Iron Works, of Minneapolis, have a full exhibit of roller mill machinery. The Detroit Blower Company show a line of blowers. The Underwood Belting Company, of New York, make a good showing of leather belting. Brick machinery is shown by W. L. Gregg, and Chambers' Bros., of Philadelphia, and the Simpson Brick Press Company, of Minneapolis. Barrel machinery is on exhibition from Archer Manufacturing Company, of Detroit, and F. E. Prince & Co., of West Randolph, Vt. The Wiley & Russell Manufacturing Company, Greenfield, Mass., display a line of taps, dies and tools for machinists. Carl Gale, of Chicago, makes a display of wood-working machinery.

Those above mentioned are but a few of the exhibits in the machinery line. It is proper to note that some of them are made by the manufacturers' agents in Minneapolis, prominent among whom are the machinery houses of J. H. Kerrick and Dennis & Co.

There are plenty of attractions for visitors, including a fine art gallery, concerts by the Mexican band, and a view over two large cities from the tower.

Selling Steam Engines by Horse-Power.

When a builder sells an automatic steam engine as of a given horse-power, the fair assumption is that the rating is from a mean effective pressure that will give good economical results. This would be satisfactory enough if there was general agreement as to what this pressure was. But amongst engineers, to say nothing about steam users, there is difference in opinion on this subject. And this is where the trouble comes in. For steam pressure 75 to 80 lbs., 25 lbs. mean effective pressure was considered about right only a few years ago. Better light on this subject has led to a gradual increase, until now 35 to 40 lbs. is nearer the practice. The builder may have this last figure in his mind, while the buyer, better acquainted with older practice, may fix upon the former.

If steam engines were always sold upon carefully drawn specifications this point would be covered, but such specifications are the exception in this country. The buyers of steam engines are seldom engineers, usually depending upon the parties of whom they buy for engineering advice. However honestly the builder may deal with the buyer a difference in opinion upon the point named is likely to arise, and not unfrequently does arise. If there was a general agreement as to what the mean effective pressure under ordinary conditions, and for a range of boiler pressure covering usual practice should be, it would often save misunderstanding. It should not be in the form of rules and formulas. The majority of steam users will spend no time over these. It should appear as a plain statement that steam users could understand from a simple reading, and should be sanctioned by engineers.

Waterfalls in a Dry Time.

The attractiveness of cascades and cataracts is often sadly disturbed by prolonged drouths. In the Catskills is a waterfall, where visitors pay 25 cents for a view. When the stream gets very low, it is dammed above the fall, and, when each lot of visitors is conducted below to see the water leap and foam, the gate is hoisted and the flood let loose. But admiration ceases when the reservoir is emptied, and the waters drizzle over the rock, instead of leaping or rushing. Some arrangement of this kind might help the Falls of Minnehaha or "Laughing Water," made so famous by Longfellow's poem. The great drouth of the summer has reduced the water so it does not laugh worth a straw; it hardly giggles. A Catskill summer resort owner would make it laugh—for a consideration. What to do in a dry time for falls that furnish power is more of a problem. The St. Anthony Falls at Minneapolis are covered by a dam, of which all that can be seen is a wood planking from shore to shore. When the water is high, it rolls over the dam in a pretty thick sheet. It is so low now that the planking is quite conspicuous. Last week, while we were looking for the St. Anthony Falls, we noticed a gang of men wetting down the dam to keep it from becoming so dried by the sun that it would leak through the cracks. It is said that the water has not been so low for years past.

We can see no certain way of helping utilized waterfalls to do their work in time of drouth except by putting in steam engines. The waterfalls can almost always be relied upon to furnish enough water for the boiler.

Labor-Saving Machinery.

A correspondent, whose name we do not give, not because he desires its suppression, asks us to publish the following:

I have read with considerable interest the discussion in regard to the Patent Office. Now I am opposed to the system altogether; I am of the opinion that a labor-saving invention is very much worse than "pauper labor," and ought to be abolished. In these days when people raise a hue and cry about the pauper labor of Europe, why don't they look about them and see the labor done by inanimate mechanism that eats no bread and wears no clothes, but turns out work at such a rate that people who work for a living must certainly despair of even imitating it. Let us abolish our labor-saving inventions before we raise such a hue and cry about "Protecting American Industry."

There is nothing more natural than that when the individual finds less work, temporarily, because of the advent of some labor-

saving machine in his line of work, he should lay the blame to the machine. Looked at in this way it does work to his disadvantage. There is no great good gained without sacrifice, and unfortunately in this particular the immediate sacrifice is on the part of the man who works with his hands. But permanently the use of labor-saving machinery is to the advantage of the workingman. Mechanics at the present time have about as hard work to "make both ends meet" as they had fifty years ago, but if they compare their way of living with that of fifty years ago the reason is apparent. This is not saying that the workingman has received all the benefits from labor-saving machinery to which he is entitled; that is quite another question. But he has received benefits that he cannot afford to throw away. If more belongs to him the wise plan is to try and get more. Any effort to set back civilization will be entirely useless. It is perfectly proper to try and distribute its blessings evenly.

Trip Hammer Belt Rig.

An old-fashioned trip hammer, driven by belt, usually requires a man at the belt tightener lever, to stop, start, or to give quick or slow blows with the hammer. A very handy rig is to hang the idler in a perpendicular frame, and attach a horizontal lever thereto, the weight of this lever being sufficient to apply the idler to the belt with all the force necessary.

The end of the above lever must be brought nearly over the anvil of the hammer, either direct, or by means of another slip of lumber, thus forming a compound lever. To the end of the lever perpendicular to the anvil block, is attached a pole, which is just long enough to allow the belt to slowly run the hammer, when the pole rests on the ground beside the anvil block. By throwing the pole away from the anvil, the overhead lever is permitted to descend until the idler bears its entire weight on the belt, and the hammer is then working to its full capacity. By placing end of the pole on the anvil block, the belt is entirely released and the hammer stops. Any desired speed can be given the hammer, without trouble to the smith, by merely placing the pole on the floor at a certain distance from the anvil block, and the services of a boy, or helper, are not required.

A Western Newspaper Train.

The *Cincinnati Enquirer*, not to be outdone by its New York contemporaries, has gone into the fast newspaper delivery business. Its newspaper train from Cincinnati to Toledo, over the Cincinnati, Hamilton and Dayton Railroad, recently made the run of 202 miles in 3 hours and 47 minutes, running time. This called for a speed of considerably over a mile a minute part of the way. Although this is not equal to the time made by similar trains on the N. Y. C. & H. R. R., it is very good indeed under the circumstances. Following is the schedule of time made:

	Miles.	Time.
Left Cincinnati		3.07 a. m.
Arrived at Hamilton	25	3.37 a. m.
Departed		3.41 a. m.
Arrived at Dayton	60	4.19 a. m.
Departed		4.29 a. m.
Arrived at Troy	80	4.54 a. m
Departed		4.57 a. m.
Arrived at Sydney	100	5.18 a. m.
Departed		5.20 a. m.
Arrived at Lima	131	5.55 a. m.
Departed		6.02 a. m.
Arrived at Ottawa	151	6.24 a. m.
Departed		6.27 a. m.
Arrived at Deshler	165	6.45 a. m.
Departed		6.47 a. m.
Arrived at Tontogany	182	7.05 a. m.
Arrived at Haskins	185	7.09 a. m.
Departed		7.15 a. m.
Arrived at Perrysburg	193	7.22 a m.
Arrived at banks of Maumee River		7.31 a. m.
Arrived at Toledo	202	7.33 a. m.

A new and important railroad enterprise is the Memphis, Arkansas and Kansas Railroad, just incorporated at Little Rock, Ark. The road is 250 miles long, and work will commence shortly. It is to run from a point on the Mississippi River, opposite Memphis, to Carroll county, Ark. Among the directors is John G. Moore, of New York, who is also a director in the Richmond and Danville, and East Tennessee, Virginia and Georgia systems, and is coming to hold a very prominent place in Southern railroad circles.

Early Engineering Reminiscences.

BY GEORGE ESCOL SELLERS.

TWENTY-SIXTH PAPER.

When entering the counterfeiter's cell in company with Mr. Wood, with the prepared work in my hands, there was a gleam of satisfaction on the man's face, but when he was shown the preparations that had been made, and then told of the decision the inspectors had come to, the change was instantaneous to that of utter despondency. He muttered, "Then I must try and be content with oakum picking these long, long days, until death relieves me; but there is nothing in it to employ the mind and bring a single moment of the rest of forgetfulness."

I said to him that it had occurred to me that a man who had shown such ingenuity as he had in producing the fac-simile of Spencer's scroll lathe work could make such valuable suggestions in the direction of preventing counterfeiting as would excite an interest in a direction that might shorten his term of imprisonment and find him employment that would put him beyond the necessity of pursuing so dangerous a business as engraving for counterfeiters. His reply was: "There is no use in it, for there is nothing, no matter how complex, that one man or set of men can do, but others can and will be found to duplicate it." I explained to him Mr. Biddle's idea that the greatest protection might be in a kind or quality of paper that could not be produced without extensive works and costly machinery that could not be worked secretly. This brought the first semblance of a smile that I had seen on the man's face, as he said: "I suppose Mr. Biddle felt secure with his shaded, water-marked paper; that no paper-maker could be found to imitate it. Why, I made that paper in a room not over 12 feet square, with only two wash tubs, a bucket, a basin, a plain wire-faced mould, just large enough to make a sheet for three bank notes, a common copying press, a few small sheets of polished zinc, and I cut up a well-worn woolen blanket for felts. By soaking and reducing to pulp a piece of the genuine bank note to be imitated, with my microscope I found the character of the linen fiber and the shreds of crimson floss silk, and their relative proportions in its composition. I found on sale a strong, heavy linen paper, hand-made, with a fiber closely resembling that of the bank note. I bought a quantity of it, soaked it in one of my tubs, changing the water to get rid of the animal sizing, and by hand reduced it to pulp. The threads of silk I got by folding and scraping on my knee a crimson silk pocket-handkerchief, just as lint is scraped. My second tub I used as a vat to mix the pulp to the proper consistency to form the paper when I dipped my mould." On my remarking that he must have had some knowledge of paper-making, his reply was: "A little. Before I was apprenticed to the tannery, I was the layman's assistant in a hand-making paper mill; I carried the wet sheets and hung them in the drying loft. I tried my hand at couching, and occasionally the vatman allowed me to dip a sheet or two." But you said you used plain moulds; how did you make the shaded water-mark with them?" "Oh, that was simple enough. It was evident the dark shade was from a slight thickening of the paper when formed on the mould by depressions in its face, and which, to take a uniform impression from the copper plate, must be reduced to an even thickness by pressure, which so consolidates the fiber in the thickened portions as to produce the dark shade. I should have adopted that way, but I noticed on the sheets of paper I bought some darker shades that held the same relative position on several of the sheets, but not on all of them. They were not like the spots caused by water dripping from the deckel when removed by a careless vatman. If from indentations or undulations in the wire cloth I should most probably have found the same shades in all the paper I bought, but no paper-maker would allow uneven face moulds to be used. There must be some other cause.

I asked myself the question: what would be the effect if a careless workman allowed some spots of his mould-face to become clogged, and the interstices between the wires closed on the distribution of the pulp or fiber as the water drained from it? Shellac varnish and a camel's-hair brush soon solved the question, and I was not long in finding what portion of the wire face in connection with the wire water-mark must be closed to produce the shading." He then added, "Explain this to Mr. Nicholas Biddle, and he will see how futile any effort at producing a water-marked paper that cannot be imitated will prove; there are more ways of killing a dog than by hanging him."

At this stage of the interview Mr. Wood left me alone with the man, afterwards explaining that as I had struck a chord that had made the man more talkative than he had ever been, his presence might be a restraint. After he left, I again expressed regret at the decision of the Inspectors; that I had hoped while working on the dies, to have seen him frequently, and learned his ideas as to the best mode of preventing counterfeiting, which would have been used, as I had suggested, to his advantage, but as he was not allowed to do that kind of work this would be the last time I should see him, and that I was sorry I could not say to Mr. Biddle that he would co-operate with him in his efforts to produce a note that could not be counterfeited, even though he believed that not to be possible. Naming Mr. Biddle seemed to rouse a very demon within him, for he passionately exclaimed: "Nicholas Biddle is the last man I would have anything to do with. It was his red-haired emissary that hounded me to where you see me. I am what is called an unbeliever. There is not a particle of superstition in me, and yet all the time that fellow was winding me around him, helping me to perfection in my work, I had the feeling that we had met before. I should have seized and throttled him, and charged him with having tried to trap me on an island in the St. Lawrence, but I believed that I had ocular proof that the fellow was drowned. I saw his mutilated remains in Montreal. I saw the clothes he had on when he attempted to escape from the island by swimming the river. I saw some of my own tools that were taken from his pockets when he was dragged from among the cakes of ice in the river. If there is a devil that can take a human form, these two men were the same and that devil."

After he had quieted a little, I again advised his considering the possibility of obtaining a pardon by aiding in the efforts making to prevent counterfeiting. "No use, no use; you are asking me to do what is impossible." He then added, "I know from what you have said that you believe, with my ability, I might have had wealth and position by an honorable course, but you do not know how I was wronged by men then in high position, my family reduced to poverty, my character traduced, nor how sweet revenge is. I swore to have it, and I have kept my oath. By counterfeits undetected I broke their institution and reduced them as low as they did me, but at what a cost. For over thirty years I have been dead to my family and connections; I have lived the life of a dog; I have recklessly squandered all I ever made by hard work and degradation to utter misery; when entrapped I had no means for my defence, and was deserted by the cowards I had made rich, and had become bound to and entangled with beyond a possibility of escape. All they did for me was to procure indirectly the attorney that defended me, but it was of no use. That $5 plate would not have convicted me, but that devil had placed among my things the part finished $10 plate that I had refused to work on, and that I now am convinced was a genuine plate belonging to the bank."

Thinking he had exhausted himself, I was about signaling the corridor walker to notify Mr. Wood that I was ready to leave, when he stopped me, saying that if I knew the circumstances that led him into almost a life-course and his present position, I would not judge him so hardly. He had long ago resolved what was left in memory of his early life should die with him; but since he had been talking to me, he had been seized with the feeling that he must unburden himself, not in justification, for that was not possible, but in case of his death, which he hoped and believed would be soon; circumstances might occur that what he proposed to communicate might be used in a way to make some amends for his many misdeeds. With the long story that with marvellous volubility he poured into my ear, we have nothing to do here, save one point, showing what apparent trifles change man's destiny.

When depending on daily labor to support his family, he was in Boston. Wishing to take some present to his wife, he found that after paying stage-coach fare for over 100 miles to his home, he had just money enough left to purchase a set of silver teaspoons; but there was no time to have initials engraved on them before the stage would start. The silver smith gave him a burin, showed how to hold and use it, told him to smooth off the face of a copper cent to practice on it before atttempting to letter the spoons. He was so successful that his neighbors were glad to have him letter their spoons, thimbles, etc. Then came names on dog collars, and finally, as a business, engraving plates for visiting cards, in what time he had from his labor in a tannery. This was his first step into a course of retaliation and revenge against the heads of the institution that he accused of having wronged him, whom he referred to in his previous outbreak.

The earnestness and fluency in telling his story was such that under ordinary circumstances would have carried conviction of its truthfulness, but I could not rid myself of the feeling that it was the outpouring of a diseased brain, and so represented it in repeating his story to Mr. Wood. But he took a different view; he thought an investigation following the hints given would develop more truth than fiction; at all events we must fully report to Mr. Biddle. When that was done Mr. Biddle agreed with Mr. Wood, and undertook to have as thorough an investigation made as possible.

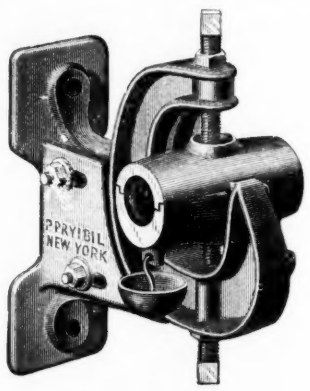
About this time there came from John Dickerson, of London, specimens of his machine made safety paper, in which shreds of crimson floss silk were introduced between two laminæ leaving the surface smooth and free to take the impression from the copper plate, instead of being mingled with the pulp, and thus incorporated in the body of the paper as was practiced in America. The samples were objectionable on account of being thicker than was used for American bank notes. But Mr. Biddle's active mind at once suggested the possibility of introducing between the laminæ the fine fibers of crimson silk so woven as to form devices somewhat similar to line engraving, and from the device in one note to pass to the next either in straight or winding lines, so that when the notes were cut apart the silk could be seen in the edges. That if that could be accomplished a perfect safety paper would be the result. Much thought was expended on this idea, as the devices must be formed and inserted simultaneously with the paper making, and for this costly and complicated machinery would be required. This met Mr. Biddle's views, for in its complication and costliness he looked for safety; sufficient advance in plans was made to show the thing to be possible, and approximate estimates of mill and machinery were made, when the entire scheme was abandoned in consequence of a hand-made specimen to show what the general appearance of the center silk marked paper would be. This specimen did not carry out the idea of forming the devices of many filaments of silk that would pass from the device in one note to the next either in straight or waved lines that would show a floss edge when cut apart, but was made by a single strand, showing what could be produced without the aid of the machinery, that Mr. Biddle was looking to as the greatest

safeguard he pronounced the specimen beautiful, much beyond what he anticipated, but at the same time it was to his mind confirmatory of what the convict had said: "That what one man could do others could and would be found to duplicate."

The manner the specimen (Roman letters U. S. with a spread eagle between them) was made was very simple. A plate of transparent glass had floated over it, that, when dried, left a thin pellicle that was neither adhesive nor absorbent; over this was floated an adhesive gelatine so deliquescent that by breathing on it its surface became very sticky. This plate when prepared was laid over a clearly drawn design, then with a hollow pointed handle or pencil, similar to the even pointed lead pencil, a fiber of crimson silk from a freely turning spool in the handle took the place of the lead; the end of this fiber was pressed on and secured to the gelatine by a needle point in the left hand, the fiber being drawn from the pencil as it traced the design by gently breathing directly down on the plate; the gelatine was kept sticky and held the silk, partially embedding it; in making short turns when filling in the design with delicate traceries the needle point had frequently to be used, when the design was complete: for security, a dilute float of gelatine was given. The next operation was at a paper mill at the time making bank note paper; a very thin sheet was crushed on the post of felts, fanned for a few minutes to consolidate and partially dry it, then the silk design on the glass plate was crushed on to it transferring the silk from the plate to the paper; the perfect transfer was a delicate matter, and involved several failures. After being successfully made, a thin sheet was crushed on to it. The manner of finishing, getting rid of the excess of gelatine size, etc., is needless to refer to here. At the time the scheme was abandoned I thought it too hastily done; for I then and still believe it was in the right direction. The proposed use of many hundred filaments in forming the devices, with the floss edge to the notes could only be produced by complicated and costly machinery, and could not be imitated by hand.

I think it was about two years later that my sister, on her return from England, told me that on visiting a great institution she was taken into the engraving room, shown some exquisite machine work, and introduced to the maker and inventor as an American She said his sharp features, deep-set, piercing eyes never could be forgotten. On some reference being made to Philadelphia, he asked if she was acquainted there. On her replying that it was her native city, he asked if she had ever met me. When she told him I was her brother he gave her a piercing look, turned to his table, wrote a word or two on a scrap of paper, folded and handed it to her, saying: "Hand this to your brother, and say to him no deeds or words can express the gratitude I owe him; say all is well with me, he will be glad to know it." Supposing the paper to be only the man's name, she put it unopened in her pocket-book. When she described her interview, the man and his work, and I opened the slip of paper and found on it only five letters, the surname under which the counterfeiter was convicted; who I supposed, if not dead, was serving his long term in the Eastern Penitentiary of Pennsylvania, I was amazed, as no other man could answer the description given. I went to Mr. Biddle to learn if he could throw any light. On my reporting what I had learned from my sister, he said he was glad to have her confirmation to reports he had from London, and then went on to say that he thought he had told me the result of the inquiries he set on foot that had confirmed much of the man's story to be true. That about that time he had a letter from his London correspondent, who was the head of the institution my sister referred to, asking if he knew any man in America competent to do certain portions of the mechanical engraving, that could be induced to go to England; he had replied that the only man he knew was serving a long term in the penitentiary for counterfeiting; that he told as much of the man's story as he felt at liberty to, and said his belief was if the man could be released by pardon, taken away from all his former associates, placed in a position that would supply his wants under such surveillance as he would have in their institution, he believed he could fill the place to their satisfaction. The reply came that, if the pardon could be obtained, they would take the risk. With this letter Mr. Biddle had personally gone to the Governor, represented the case, obtained the pardon, placed the man in charge of a trusty employe, who never let him out of sight until he left the steamer by the pilot boat outside the port of New York. All the accounts Mr. Biddle had received from London were favorable. I will only add that his course was such that gained him confidence and respect; and when unable from age—probably premature, from early dissipation—to perform his work, he was maintained in comfortable circumstances by the institution he had faithfully served. Although it is now over fifteen years since his death occurred, reasons still exist why I am not at liberty to name him.

It affords me pleasure to pay a just tribute to the noble trait in Mr. Nicholas Biddle, who, so long as it was for the interest of the United States Bank, untiringly pursued the man known to be the most expert and dangerous counterfeiter of the time, but believing in



POST HANGER.

reformation, rather than vindictive punishment, after the man had received a just sentence, instead of dismissing the matter from his mind, continued his investigations until he felt the world would be the gainer of the man's ingenuity if properly directed. He then lifted him out and gave him a chance, with the result as I have shown.

I speak knowingly when I say that during the most prosperous days of the United States Bank, with Mr. N. Biddle at its head, the internal improvements of the country, the prosperity of the manufacturer and producers, even to the humblest mechanic, found in him a friend and aider.

Improved Sliding-Hook Post Hanger.

In this hanger means are provided for accurate adjustment in a direction towards, or away from, the post or wall to which it is attached. The convenience of this in lining up the shaft need not be mentioned, when compared with the usual method of blocking out or "shimming" for the horizontal adjustment, which is of equal importance with the vertical adjustment.

The box is pivoted, self-adjusting and self-oiling.

The manufacturer is P. Pryibil, 461 to 467, West 40th street, New York.

Combination Dado, or Grooving Head.

This head can be used on any saw arbor; it is, in a limited degree, adjustable by packing between collars.

The two outside saws determine the width of cut, while the center saw removes the intermediate stock.

The manufacturer is W. R. Fox, Grand Rapids, Mich.

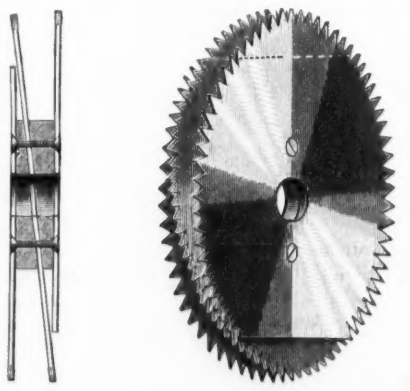
English and American Locomotives.

* * * The question, to our mind, is a purely mechanical one, and as such requires a purely mechanical treatment. In the first place, what is the main point in which American locomotives depart from the English type, or more correctly, in what feature has English locomotive practice departed from the earlier features which formed the basis of the practice of both England and America? Clearly the framing is this feature. Early English engines had the bar frame, and it is but quite recently that some old engines of Bury's make were to be seen at work on the Lancashire and Yorkshire Railway. They had only four wheels, all coupled, bar frames and huge copper-covered fire-box casings. From this original type English practice has departed, and we now have thin but deep frames of plate which admit of the widest possible fire-box between the frames. American practice adheres to the bar frame, though it is sometimes modified by flattening alongside the fire-box, and in the Wootten engine the fire-box is made to extend over and beyond the frames.

For years past the track of pretty well every English railway has been so good that engines have been built to suit such first-rate tracks, and such engines, as a consequence, are scarcely suited to run on a bad road. Many—most American tracks are very far from first-class, and though many hundred miles of track in the States are perhaps as good as any track in England, there are still thousands of miles very inferior. This cannot but be otherwise when it is considered that the line is often laid unballasted over the almost natural surface of the ground. On this account, therefore, the design of American engines has developed accordingly, and they are so constructed as to be safely capable of traversing a track which would derail an English engine. Such a design, however, does not prevent the engine from running well over a good road, and American engines have developed speeds as high as any other build. As a piece of machinery there is much about an American engine which will appear rough and ill-finished to the eye of an English workman. By this we do not mean ill made, but the finish is rather rough and does not compare with that of English first-rate work.

There is a superfluity of moulding about the dome and sand-box which hardly adds to good appearance. This will be shown in our illustrations. The wheels of even an American express engine are of cast iron. This only proves the excellent quality of American cast iron, and as a detail of construction is one which is bound to give way, as is also the English forged iron wheel, before many years to the wheel of cast steel, such as may now be seen at the Liverpool Exhibition. Cast steel will prove superior to both other materials and far cheaper than forged iron.

Several other details of construction are weak in appearance, but we are assured by an English engineer, to whom we referred the matter, and who has had 13 years' experience on American railways, that such is not the case. There is one point upon which we must touch in justice to American builders; we refer to the exceedingly free running



GROOVING HEAD.

qualities of their machines. Other things being equal the American locomotive is freer running than is the English. This we can only attribute to the greater freedom of various parts, the free use of compensating beams, the absolute horizontality of the outside cylinders reducing rocking to a minimum, and to the arrangement of the valve mechanism. Our personal experience and the testimony of a goodly number of drivers, who have been accustomed to handle both types of engines, is in favor of this statement.

A point aimed at by American designers is evidently accessibility of parts, and we think no one will quarrel with us when we state that the very opposite effect has been attained by the designers of inside cylinder engines, with valves between the cylinders. Nothing could well be worse than this. At the same time, with all the conveniences to be found on a modern railway, the awkwardness is much diminished. Such a construction would, however, be quite inadmissible on an engine which might require repair 500 miles from anywhere.

To what conclusion are we forced by all these considerations, backed up as they are by the fact that England supplies no engines to Canada, for example? We cannot for a moment admit that we are unable to compete, for such an idea is absurd on the face of it. England can compete successfully with any other nation if she cares to do so, and if English locomotive builders would do so they could produce locomotives having all the accessibility of parts seen in the American engine; they could use cast-steel wheels, produced as cheaply as the cast iron wheel of America; they could make their fire-boxes of steel, for it is sheer nonsense to say we have no steel suitable for boilers, and nothing but ignorance could support such a statement in the face of the testimony of all the best boiler makers of the country. As regards the bar frame, this is too simple to require comment. If called for let it be made. Quite apart from the question of whether one engine is better or worse than another, our constructive engineers would be wise if they laid themselves out to supply a demand, not to force a sale.

New countries require many articles which differ from the articles required for similar purposes in older countries. America, as a new country, has made locomotives to suit its peculiar requirements, and thus we find her supplying other new countries to a very large extent. Probably, if tried on some of the older lines in America, such as the Philadelphia & Reading, one of Mr. Stirling's outside cylinder 8-ft. engines would give immense satisfaction to both the road officials and the passengers, but if this engine were to run towards the West it would tone gradually down in estimation as the roads became more uneven.

We have personally known firms of a high reputation refuse to make little alterations in their engines which they have been requested to make by their own agents—for climatic reasons, too. No; this part runs well at home, why not, then, with you; with you being perhaps 20 nearer the equator? All this may seem trivial; it is, however, very important. We have repeatedly called attention to such facts as a matter of duty. We have heard hard swears in warm climates at many a close fit in detail which should have been a free fit, and we have seen men who have occupied good positions, where they might have learned something if they would leave a colony as pigheaded as when they entered it; and trade keeps slipping away from us, who are better fixed for carrying it on than any other nation, and all because of our wilful blindness. The American tariff is a proof that we cannot be touched in fair competition, and we go on handicapping ourselves by using copper for fire-boxes when steel would suffice, brass for tubes which are received from America in iron, and so on. We do not uphold work when cheapened by bad execution, but when cheapened by the known substitution of a cheap for a dearer—and, to some minds, an inferior—material, we can see no objection to it, so long as it is sold for what it is. An American engine is said by one writer to be £400 cheaper in material, etc., than an English engine, and though we cannot endorse this writer's figures, as he has scarcely the experience upon which to form reliable opinions, the statement is substantially in the right direction. Now, £400, or half this sum, is a big discount from the present cost of a locomotive, and well worth attention. We therefore maintain that the question of English *vs.* American locomotives is not whether either is better than the other, each in its own peculiar conditions, but which type is called for by our customers abroad, why or from what special qualification the call arises, and how best it can be responded to in England.—*The Mechanical World.*

Power Absorbed in Cutting Cast-Iron.

BY JAMES F. HOBART.

For the purpose of determining amount of power used in cutting iron by different shapes of lathe tools, a dynamometer was attached to a 20″ Fitchburg lathe, the use of which was tendered by T. R. Almond, Brooklyn, N. Y., for a course of experiments.

The engraving shows method of attaching dynamometer to lathe. *A* is the main shaft, *H* the lathe counter and step pulley. *L* is the lathe, and *I* the step pulley on spindle. Pulleys *C* and *G* remain as ordinarily used for driving the lathe ahead. The reverse belt was removed from pulleys *F* and *B*. A short counter shaft *J* was mounted back of the lathe, and the dynamometer *D* placed upon it in line with pulley *F*.

Tight and loose pulleys *E* received a belt from pulley *B*, which was moved along the line shaft from *A*, to where it is now shown.

This method of attaching relieves the dynamometer of much wear; the clutch *K* enabling direct power from pulley *G* to be used in getting a cut ready; when by engaging *K* with pulley *F*, the dynamometer reading may be taken at will.

The dynamometer used was patented by Horace C. Hovey, Ayer, Mass., and was loaned for this course of tests by its present owner, R. H. Gray, of the above named town.

The dynamometer shaft is secured to the hub by 8 set screws, placed in pairs at angles of 90 degrees in order that the dynamometer may be centred and secured upon the shaft.

The shell or belt pulley is separated from the hub by a number of rolls, which convert movement between hub and shell from sliding into rolling friction.

A bar cast to the hub engages the shell pulley through the medium of springs which are compressed according to the power applied through the pulley *E*, and applied to the lathe by pulley *F*.

By means of a device similar to steam gauge rack, pinion, hand and dial, the movement between the dynamometer hub and shell is registered.

In making up the readings upon the dial face, the shaft *J* was locked to prevent all movement, and a 5 pound weight attached to pulley *D* by means of a wire and hook which engaged one of the set screw holes.

Fig. 5 on the dial indicates where the pointer stood with a load of 5 pounds on the wire. Weights of 10, 15, and up to 60 pounds were placed on the wire, and the position of the hand marked on the dial as before.

The dial reading now represents actual pull of the belt in pounds. To reduce it to horse-power, multiply circumference in feet of pulley *D*, by dial reading, by revolution per minute, and divide by 33,000.

It was found upon stopping the apparatus that the dynamometer would return to within $\frac{1}{4}$ pound of zero, this amount representing resistance of internal friction, and friction of clutch pulley *F*.

When this dynamometer was first tried, the index hand was found to fluctuate excessively at every increase or decrease of resistance. A slight touch upon pulley *D* would cause the hand to jump 30 to 50 pounds upon the dial plate. To remedy this defect, the shell and hub were also connected by an equalizing device consisting of a piston $1\frac{1}{4}$ inches in diameter, working in a cylinder full of oil. Two holes about $\frac{1}{16}$″ each in diameter were drilled through the piston, which fitted easily into the cylinder. Before many experiments had been made, it was found necessary to close one of the holes entirely, and to put a piece of wire in the remaining hole which reduced the area to about $\frac{1}{3}$ its original size.

The dynamometer, in these tests was run at a speed of 365 to 390 revolutions per minute, thus giving it a capacity of about one horse-power.

In boring a 14″ flange coupling, various conditions of hardness or density were found. The coupling casting was 7″ long, and cored out about $3\frac{1}{2}$″ in diameter.

Two roughing cuts were run through the casting, leaving the hole 3.75″ in diameter.

A boring bar $1\frac{1}{2}$″ square, *a*, Fig. 2, was bolted to the lathe carriage in place of the usual tool-post, and a cutter *b*, $1\frac{1}{2}$″ diameter, put through a hole, and secured with a set-screw *c* near end of boring bar.

The cutting edge of tool *d* was ground at an angle of 75° with axis of hole to be bored. The clearance shown at *e* was 28°, and rake of tool 39°.

The dynamometer reading at beginning of cut, was 15.5 lbs., of which 8.25 lbs. was consumed in lathe and countershaft friction, leaving the direct belt pull consumed by cutting tool equal to 7.25 lbs.

The speed of dynamometer was 365 revolutions per minute; circumference of its pulley, 1.7+ feet, giving a belt speed of 620.5 feet per minute.

At point of cutting tool, the diameter of bore being 4.02″, the circumference was 1.05+ feet, and the work making 15 revolutions per minute, the cutting was done at a speed of 15.75 feet per minute, taking off a chip .135″ by .021+ thick.

From the above data may be calculated the direct pull upon cutting tool to drag it through the iron, or to force the iron over the tool.

At the dynamometer 4498.625 foot-pounds are consumed in driving work over the cutting tool, exclusive of 5119.125 pounds required to drive lathe and countershaft.

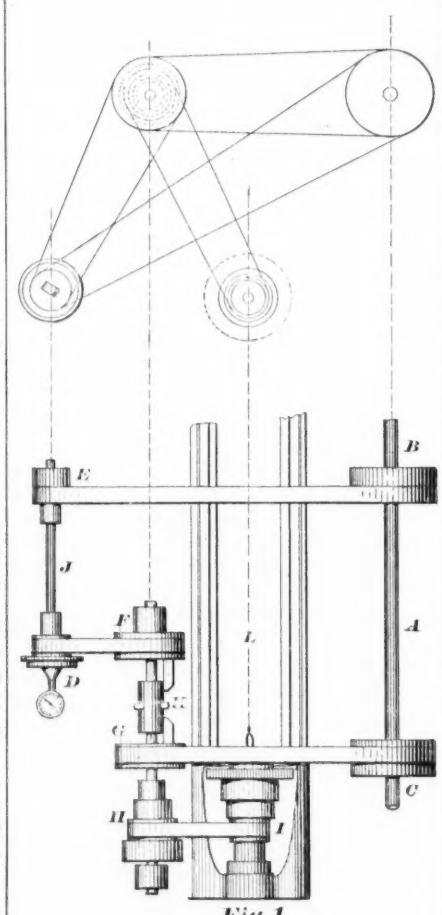


Fig. 1

DYNAMOMETER.

At the end of cutting tool the work done is, as above, 4498.625 foot-pounds, and as the work travels at a velocity of 15.75 feet per minute, then a pressure of 285.63+ pounds is necessary to force the work over the tool one foot per minute.

As the boring proceeded, considerable difference in density of the iron was noticed For convenience the readings of pressure will be given in pounds pull upon tool at circumference of the work; in all cases the friction of lathe and shafting being deducted and only the resistance of cut being given.

When the cut was first started the dynamometer indicated 7.25 lbs.; at a depth of 3″, 8.50 lbs., and at points diametrically opposite the pressure varied about one pound, but this variation gradually disappeared as the tool approached the face of the coupling, which was upward when the casting was made.

The following table shows the number of pounds required at different depths of the bore or towards top of casting, at which place more power was required, although the iron is supposed to be the more dense at the bottom.

BORING TOOL.

No.	Depth of Bore.	Pull on Tool.
1	$\frac{1}{8}$″	285.63
2	3″	334.87+
3	4″	305.32+
4	$4\frac{1}{2}$″	245.96+
5	5″	256.07
6	$5\frac{1}{2}$″	275.77+
7	$5\frac{3}{4}$″	305.32+
8	6″	285.63
9	$6\frac{1}{4}$″	324.32+
10	$6\frac{1}{2}$″	337.87+
11	$6\frac{3}{4}$″	364.41+
12	7″	384.11+

The variation of one pound at points diametrically opposite, as above mentioned, will make a difference in cutting pressure of about 38.69 lbs. pull on the tool, and is caused by the variable density of the iron.

This condition of the casting will readily explain why holes in gears and pulleys are sometimes found to be oval, and why we cannot always turn up a true cylindrical shape in the lathe.

In forcing crank-pins into their places after the work has been accurately bored and turned it is sometimes found that the pin is not true with the wheel or crank.

How much of a factor may be represented by the above difference in density of iron is yet not entirely known, but must be considerable.

With the coupling mounted on a $4\frac{7}{16}$″ iron arbor between centers turned up to 60°, the friction of lathe and countershaft, when dynamometer ran 365 revolutions per minute, and lathe 1 to 43.75 of dynamometer was 8.25 pounds.

Die Sinkers' "Turntable."

A handy "turntable" for holding heavy steel blanks for dies can be made of cast iron, semispherical in form, and about 12 inches in diameter. This device is virtually a 12-inch ball, cut in half, with three lugs projecting from the plane side. One of these lugs is fitted with a set-screw, and is placed on the edge of flat side, opposite the two remaining lugs, which are far enough from the set-screw

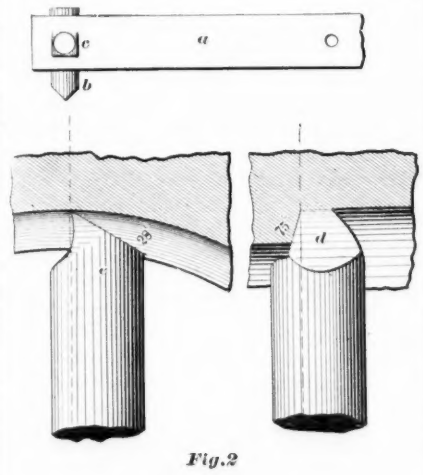


Fig. 2

to admit the largest die made being placed between them.

A hole, about 8 inches in diameter, is cut in the work-bench, and the spherical side of the device placed therein. The whole device, in fact, forms a ball and socket joint, by means of which the die may be placed in any desired position, handy to the die sinker.

Pressure Gauges.

The *Locomotive* has this to say of pressure gauges:

The greatest care should always be exercised that gauge connections be properly made. Gauges should never be attached directly to an iron uptake or flue, as they frequently are; the heat takes the temper out of the spring, and a very short time suffices to so seriously impair its strength and elasticity, that its indications are utterly worthless, if accuracy is wanted. Where it is absolutely necessary to attach the gauge to any surface exposed to but a very moderate degree of heat, a thick layer of some non-conducting material should always be interposed between them to prevent overheating the gauge.

For like reasons a siphon arrangement of the pipes connecting gauges to boilers, or some equivalent arrangement, should invariably be used so that the gauge-spring may stand full of water when steam pressure is on. This admission of steam of high temperature to the spring will, in a very short time, destroy its elasticity and render its indications worthless.

Care should always be exercised when gauges are screwed to walls by means of the flange nearly always provided for that purpose, that in making the connection with the union the gauge is not cramped. Serious errors may be introduced if this matter is overlooked. A recent case in our own practice will illustrate this. A battery of seven boilers were run together, and all the boilers had gauges precisely alike. These gauges were screwed to a board attached to the front wall of the setting, and connected to the boilers by quarter-inch pipes and unions in the usual manner. All of the gauges were set at the same point by comparison with a standard gauge, and were then put up and connected with the boiler. No two of them now indicated the same pressure, the variation being as much as five pounds, which amount is inadmissible where accuracy is required. A very little investigation revealed the cause of the trouble. The piping was not done with extreme care, and where the connection with the union was made, the spring was cramped sufficiently to cause the error. A little straightening of the pipes, so that the unions came together perfectly fair, remedied the trouble completely.

An Explanation.

Mr. Noitall (explaining)—You see, they build a fire underneath the floor of the engine, and when it gets hot enough, they put the boiler on and open the cylinder door, and that lets the steam get into the wheels, and away we go.

Ladies—Oh, thank you! We often wondered how it was done.—*Puck.*

Old and New Processes.

BY S. W. GOODYEAR.

Having had an outing since writing you last which took me among the shops to some extent, I saw and heard much which confirms me in the belief that the advantages which we are enjoying through improved machinery and methods, as compared with the "main strength and awkwardness" of thirty years ago, will hardly be exaggerated by the most enthusiastic writers on the subject.

Who of us, old fellows, who begun our shop experience in the forties but remember the wrestling with turned shafting? First to turn it; two chips, and file to gauge. Next, to get a pulley to slide the whole length of the shaft which was supposed to be all the way of a size. How we have worked and tugged to get a pulley past some big place to have it so loose just where it was to run, as to make us ashamed of the man who turned the shaft. Of course the most of us did this after fitting with a file instead of grinding with sand and water, and some of us would do it that way now. But, seriously, it was quite a job in the good old times to turn out a good lot of shafting, uniform in size, and round. Filing was often depended upon to get the size, and so much filing was done many times as to make the term round a misnomer as applied to the finished product, in any sense except comparatively, as distinguishing it from square.

Sometime during the war I had quite a job on shafting in the fitting up of a new shop in which there was the usual main line, and in addition there were as many long countershafts as would have made four or five extra lines the entire length of the shop. As each of the counters was to run from four to six machines through the medium of friction-clutch-loose-pullies (after a style for which Pratt & Whitney held the patent) it was desirable to have these pieces exact to size and round. I determined to substitute some better and quicker method for the old plan of turning to calipers and filing to gauges, and proceeded to make a hollow mill. It may not be necessary to tell all the readers of the AMERICAN MACHINIST that the mill worked splendidly

for a little while, but soon stuck on the shaft. It did just that. About that time I thought of something, and a few minutes later I might have been seen squatting in front of the forger's anvil marking out what I wanted in the dirt, and giving dimensions in figures. What I got was a shank as wide and thick as would go into the tool-post, with a hub on its front end of say $2\frac{1}{2}''$ or $3''$ long, to be bored out to represent a bushing in which the shafting when turned would run. At the front end of the hub I had a projecting lug of say one inch in depth in the direction of the axis of the bushing, $1\frac{1}{2}''$ or $2''$ thick, and as long as would give room for two set screws. Boring the bushing to a nice running fit for the size of shaft to be turned to, cutting a slit through the described lug of say $\frac{5}{16}''$ wide and as deep as reached to the front end of the bushing, the slit almost ranging clear of the bearing for the shaft, putting in the two set-screws, making the blade, which was simply a flat piece of steel with its front, cutting end, bevelled like a carpenter's plane iron or chisel, and the device which I "had had in my head" was complete. The tool was to cut on the same principle that some of us bungling machinists have so often admired in the finishing touches in wood turning. It went in with the flat side toward the shaft. I made an extra tool post. This gave me a place for my diamond point tool to rough to nearly the size, which my new invention—it never had a name—followed and finished to size. I rigged up an arrangement for delivering a stream of soda water on this cutting, shaving tool, and by having the end next the face-plate turned to size for as much distance as was required to clear in running up, it was fun to see this rigging walk over a piece of shafting.

The proprietor, whose superintendent I was of the work in question, was enthusiastic over my invention, and was anxious to at once proceed to secure a patent, but I explained to him that it was simply one of the successful mechanical arrangements of which there were thousands just as worthy that would never be patented. "But," said he, "you are turning as much in one day as would take two or three days the old way. Yes, as much as would take a whole week the way some men work." It did not get patented, and I have not turned, or had turned, under my supervision in twenty-five years' service, so much shafting, and put it altogether, as this simple, cheap rig turned at that time.

Who don't believe that there have been great improvements in shafting lathes since the time of which I write? In the AMERICAN MACHINIST has been recorded by contributors the turning of over 300 feet of two-inch shafting in ten hours. Within a few years, in answer to the question, "How many feet of $2\frac{1}{2}$-inch shafting can you turn in ten hours?" I got the answer from a thoroughly reliable man, "160 feet to 175 feet, and of two-inch 225 feet." This was in the very works where I am satisfied that thirty years ago days' works were put in which did not show thirty feet; and if 50 feet to 60 feet were turned, it was doing well. What started my pen on this subject? does some reader ask. This: Going through the works of a well-known machine tool builder the other day, I had my attention called to a lathe especially designed for turning shafting, and was told that 350 feet of $2\frac{1}{2}$-inch shafting could be turned on it in a day! In the same works a radial upright drill is built which deserves the name universal. A special planer for railroad use in tapering rail heads showed some novel features, adapting it particularly to the work for which it was designed. It ran back five times as fast as the cutting motion. There was no shifting of belts, the table being carried by friction. Instead of the ordinary plain V's, the bearings extended upward vertically for some distance above the V's.

With the immense side pressure of cutting with a side tool, on a vertical line a chip of $\frac{1}{16}''$ thick by more than an inch wide, the value of this was apparent. The friction driving device was peculiar in that the hold was increased by side thrust of spiral gearing just in proportion as the cut and resistance increased, and *vice versa*.

A special lathe for railroad shops, to be used in turning the tread of wheels, seemed admirably adapted to that use. The ponderous carrying plates, with radial openings to admit the axles; the divided bushings for clamping on to the journals; the device for clamping, which made a sure thing of concentricity; the rigidity of combined hold on axle and wheels, which guaranteed the possibility of all the cut which tools will stand, and still insures the same truthfulness of work as though light chips and "just skinning" were the rule, as I remember was the practice in some shops where we wrestled with the same sort of work to fill in time when we old fellows were boys, especially interested me. It brought to my mind the vision of a car-wheel on the overhanging face-plate of an ordinary lathe, with a beardless boy, having long hair turned under in a roll, manipulating the tool, which, in a din of chatter and tremor and groan, removed less iron in a whole hour than could be taken off by this modern device in five minutes. The boy is gray and bald now. The old shop, which did not keep up with the times, is gone. The old man, who was the boy, visited the place not long since, after nearly forty years of tramping. There was a pile of turning chips, some of the foundation walls and tumbled-down flume and raceway—that was all. The pile of turning chips I was attracted by; I helped to make them; but did I feel like glorifying the methods by which they were made? No. I had to look back to the old shop and its equipment as it was in the forties. Had the old shop continued and

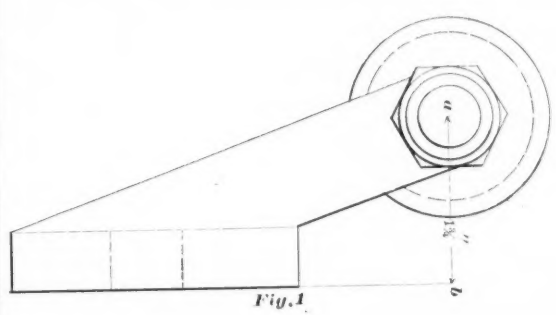


Fig. 1

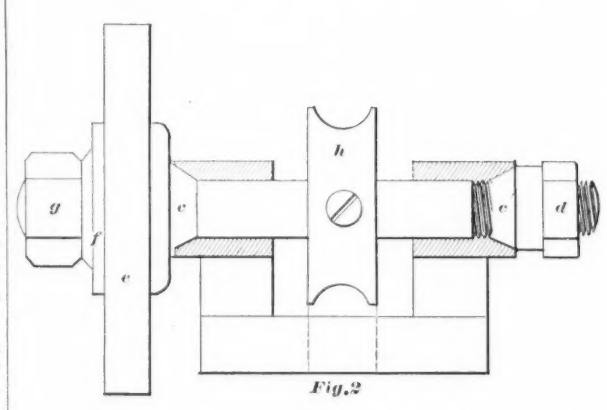


Fig. 2

kept up with the times, it would have been another thing. That 350 feet of $2\frac{1}{2}$-inch shafting turned in ten hours! Has anybody figured the weight? Three tons, about. The waste in turning, about 600 pounds, which would make, say, 35 feet in length of shaft.

This brings us to think of the cold rolled, or hot polished shafting. That thirty-five feet of $2\frac{1}{2}''$ shaft gone to chips in ten hours, or the equivalent of that length—about 600 pounds—would be quite an item toward paying the expense of rolling to size. And as "cold rolled shafting" has been decided to have 75 per cent. greater effective strength than that which is turned, while the power required to overcome the friction in use is 20 per cent less, then it must follow that this shafting question opens up like a very mare's nest to those people who see no improvement—in fact, think we are retrograding.

How does it sum up? If turned shafting is wanted, from five to seven times as much can be turned in a given time now as by the old methods, notwithstanding the positive statement of that writer who states that "turning is turning now as then." If these great advantages are as claimed for cold rolled shafting, we are obliged to admit that we did not have them in the good old times, as it is of comparatively recent origin. There has been quite a change since half the line shafts were either square or had the scale left on, if round, except at the bearings, or where turned for couplings.

A word about couplings. Of course, it won't do to speak disrespectfully of the thoroughly reliable old stand-by, the flange coupling. It will always be used, no doubt, and its advocates will swear by it. That hours have been wasted in getting one off, millions of times, and that on keying on again, it (the coupling), which ran true before, insisted upon setting up a motion in the shaft like that in the rear legs of a horse having stringhalt, has failed to produce the slightest estrangement on the part of the friends of the flange coupling. They say: "The principle is correct. If people will abuse them, putting them on with ill-fitting keys, and don't use any judgment in removing and replacing them, they may expect them to run out." Yes. Most people do. Of course, everybody is familiar with the double compression coupling composed of divided sleeve, cone rings and ring nuts, with keys that drop into place without driving. No bolts or nuts for belts to catch on. No hammering and pounding till coupling and shaft are all bruised up in putting on or taking off. Everybody don't like them, though. Too complicated, they say. But there are those who after using them will be ready to admit that they "lay over" the old-fashioned flange coupling, by a "long chalk."

I set out to say something about the improvement in wire drawing during the last twenty five years, and not a word about it yet. Worcester was, is, and from appearance will continue to be a great center for the manufacture of wire. During the palmy days of the old Quinsigamond Company I worked a great deal of wire from there into wood-screws. There was a necessity for sufficiently uniform size to insure a possiblity of feeding the wire called any particular size into the dies provided, and at the same time not too loosely to admit of forming a good full head, and without too much changing of feed from one coil to another. We were willing to accept as all right wire that did not vary from size called more than quarter of a number, and still had to return tons that we could not use. Said a prominent wax-thread needle maker, in speaking of the fact that from having been obliged to use imported wire for needles, he had come to use that of home manufacture: "It is just splendid. It don't vary over .00025" from size stated, at most, and it is just right every way." Quarter of a thousandth variation the limit in 1886! In 186— tons returned for not being within quarter of a number, which often meant from ten to twenty times the variation which is the limit now. "But Americans did not know how to draw wire then," says some reader of strong attachment for the English methods and products. Perhaps not, and I happen to know that a fine quality of steel wire was imported in those days directly from some of the most celebrated manufacturers, which varied just as badly. Don't you know that during the past quarter of a century the Americans, while learning to draw wire, have made the micrometer caliper, and learned to use it to advantage; and that to-day there is no country on the face of the globe that can beat America for quality and accuracy of size of drawn wire?

The Imperial Russian Technical Society is making preparations to hold an exhibition of petroleum and manufacturing appliances at St. Petersburg. It is proposed to make the exhibition complete in all its details, covering everything connected with this industry, which, in Russia, is a very important one.

LETTERS FROM PRACTICAL MEN.

New Tool-post Grinder.

Editor American Machinist:

Having a grinder which I think may be useful to some of your readers, I will attempt to describe it.

Fig. 1 is a side view, Fig. 2 a front view, these being sufficient, I think, to give a clear idea of the attachment I will give the sizes I used, though some of them may have to be altered to suit the lathe used. The height *a b*, Fig. 1, in my case $1\frac{3}{4}''$, should be made the same height as the lathe centers.

The cones *c c'*, Fig. 2, are bronze, *c'* being adjustable, as seen by drawing; *e* is the emery wheel, *f* and *g* the collar and nut, respectively, *h* the pulley, $1\frac{3}{4}''$ diameter, driven by $\frac{5}{16}$ round belts.

The spindle can be reversed by taking off *c d* and slacking the pulley screw. This is very convenient, as sometimes we wish to work close to either end. It is bolted in place of tool post; and with a "compound rest" on my lathe a great variety of work can be done, from grinding centers to backing off a fluted reamer. I hope I have made it clear, and that it will be of use to your readers in general.

FRED. H. COLVIN.

Philadelphia.

Patterns for Spiral-Grooved Drums.

Editor American Machinist:

In the AMERICAN MACHINIST for August 14, 1886, Mr. Geo. Allge takes me to task for making a pattern for drum with a spiral groove on its surface, and making the groove with cores. He says:

"First, there are a good many cores to make, next to set these cores and join them so that they won't leave a mark wherever they meet, the venting of them; and last of all, when all this is accomplished, what is to prevent them from dropping out of the cope when closing up the mould?"

Mr. Allge has evidently made out a pretty strong case against me, if the drum had been like the one he describes; but the particular drums I had in mind when writing the article were two, one 14" diameter, having a groove, $\frac{7}{8}''$ deep, $\frac{3}{4}''$ wide and $3\frac{1}{2}''$ pitch; the other 10" diameter, groove $1\frac{1}{16}''$ deep by $\frac{5}{8}''$ wide, $2\frac{1}{2}''$ pitch; and I purposely took the worst case I knew of, in order that it would be necessary to make cores for the groove. Perhaps I missed it in not stating dimensions at the time I wrote the article.

Neither of these patterns would draw with less than twelve staves, while, as they were small and short—only 26" long—there would not be such a terrible lot of cores to make, and there would be only half as many joints to leave marks in the groove of casting. Another thing to be considered was that only two castings were to be made from each pattern, and it would cost less to make the cores than to cut the groove in pattern.

Possibly there were to be a good many castings made from the pattern illustrated Aug. 14th. In this case I would remind the pattern-maker that after a few moulds had been made, there would very likely be marks left in the mould by the joints between staves; and these marks would be as difficult to remove without destroying the symmetry of groove as to prevent the joints between cores from showing, and there would also be twice as many of the marks to remove. While speaking of this point, I would like to ask if it would be left to the moulder to put the staves on for the next mould. If it is, it would save the pattern-maker some time; but it wouldn't help the castings any. In any case, the more castings made, the greater would be the difficulty about the marks in each succeeding mould.

As it would change the dimensions of the groove but very little, perhaps it would have been possible in the pattern illustrated Aug. 14, to so modify the shape of the groove as to do away with the necessity for either staves or cores. Either substitute $1\frac{1}{4}''$ for $1\frac{1}{8}''$ in Fig. 2 or $\frac{7}{8}''$ for $1''$; and then the half pattern would draw without any trouble.

The venting of a core the size of these ought not to occasion the moulder a great

deal of anxiety when the whole print side of core box is left open; and as for fastening them in their places, I presume nails would hold them while the mould was being closed up.

While I still consider my way the best for the particular job I was thinking of at the time, perhaps Mr. Allge's plan would have been as good for a drum of the description given by him. Taking only the cost into consideration, with the fact that but two castings are to be made, I don't think there would be much in favor of either one of the two methods for his job, while for mine I think even he will admit that cores would cost less than the difference in pattern work. Another thing, it is not essential that the groove should be perfectly smooth and true. As long as it offers no resistance to the winding of the chain, a few marks would hurt nothing but the feelings of the pattern-maker.

Considered as the best possible way to accomplish the end, a pattern made with staves would be likely to make the first half-dozen castings in the best possible manner. After a few moulds had been made, the quality of the castings would begin to deteriorate, and soon they would be no better than the ones made by cores. This is simply the effect of the unavoidable wear of pattern. As the castings would still be good enough, this is nothing against making the pattern with staves. As the cost of pattern is usually considered first, and as the other way is the cheapest while it will make the castings plenty good enough, why isn't it the best way? If I wanted to make a real nice casting regardless of cost, I should consult the moulder, and make the pattern to suit him.

While neither of the ways described would make very cheap castings, the patterns would also wear pretty fast. One way would be about as cheap as the other, for the time consumed by the moulder in making and setting cores would be consumed by the patternmaker in cutting the groove into patterns (the pattern made with cores would be apt to wear better), and thus one would offset the other; therefore, the size of drum and the shape and size of groove, with the pitch, would be the deciding points. My way was adopted, perhaps because the castings were to be bought by the pound, and therefore the cost of the pattern was of more importance than the cost of moulding to the one who was to pay the bill, while in Mr. Allge's case the cost of pattern and the cost of moulding were both to be paid out of one pocket.

The best possible way for making a great number of castings would undoubtedly be to so modify the shape of groove that it could be moulded without either staves or cores. The pattern would cost considerably more, but the cost would be divided among so many castings that it would become a very small item in the cost of castings, while the change made necessary would not be likely to make any difficulty in the use of drum, and would more than be compensated by the cost of moulding and the quality of castings.

The whole matter is simply a question to be settled by the "powers that be," and, as we have two ways shown now of accomplishing the same end, you can take your choice.

FRANK W. BARROWS.

A Curious Explosion.

Editor American Machinist:

I will try and give you an account of an explosion which has puzzled some here:

The engineer of a varnish manufactory opened the blow-off of his boiler, and raised the safety valve. The disk of the valve not being attached to the stem could come to its seat when the pressure was reduced. He opened the three gauge-cocks and went home.

On Sunday morning he took out the manhole plate and turned the hose in the boiler for fifteen minutes. He then lighted a candle, placed in a large nut for a stand, and had just got his head and shoulders in when an explosion took place, burning him about the face, head and arms in a terrible manner.

The blow-off pipe discharges into Newtown Creek at a depth of six to eight feet below low water.

The boiler is a horizontal tubular, with manhole in front-head below the tubes.

The engineer's theory is that gases from the creek entered through the blow-off pipe. I believe that there are more or less vapors arising from the turpentine, benzine and alcohol used in the manufacture of the varnish, and that after the pressure in the boiler was reduced there was a vacuum formed in the boiler which drew the explosive vapors into the boiler; consequently, when he placed his light inside, the result was as stated.

What do you or your correspondents think of the matter? CHAS. M. WOOD.

Long Island City.

[We are inclined to believe that the explosive mixtures entered from the works.]

A Convenient Platform.

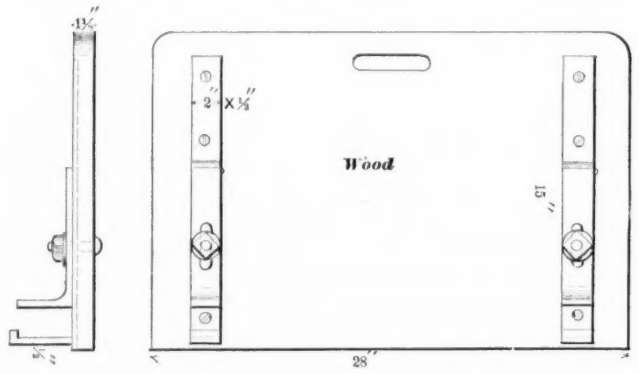
Editor American Machinist:

I enclose you a sketch of a platform to catch on locomotive side-rod while "doctoring" air pumps. You know on many roads this has to be done while the engine is at the coal pile, or in some place equally convenient. The common practice is to take a short ladder, or, if this is not at hand, to hang on the running board with one hand and work with the other.

This little platform is easily made, and will locate the workman where he can "put in his time to the best possible advantage."

The hook clamp should be made the depth of the largest rod; the slotted angle clamp will permit alteration for thickness of rod. The angle clamp can be lined with leather so it will not wear the best-finished rod.

The stationary hook clamp is let in the wood flush on the bottom, as shown.



CONVENIENT PLATFORM.

Moving the engine forward or backward will fix the platform at the right height to suit the workman.

A platform of this kind, hung up in the round-house, will save its cost every month or two. WM. H. BRADT.

Troy, N. Y.

Churning Moulds.

Editor American Machinist:

If the theory of churning moulds to take up the shrinkage is a correct one, the writer of the article in your issue of August 14 is correct in his manner of feeding with a clean hot rod in the hands of an earnest worker, churned slowly, keeping to the walls of the riser, and the average molder with the miscellaneous rod and its carrot appendage is a failure, particularly when he attaches more importance to being high chief executioner than he does to making a clean solid casting.

Nearly all foundrymen will concede that shrinkages and other defects are to be found under and near the feeding head, and it hardly seems possible that a feeding head, on one end of a long casting, can be so successfully churned that all parts of the casting are perfect except "just where the doctor himself lives," and to repeat a like process at the other end they will get exactly the same results, which, to say the least, is not encouraging.

If it is a fact that iron cannot be compressed while in a fluid state, and that the process of shrinkage begins below that point, I fail to see at what particular time the churning process is to be effective. If it is claimed to be at the time when the grains can be felt with the rod then it would affect only the immediate vicinity of the rod, but if it is while the metal is still fluid it would make it so dense that in addition to filling the shrinkholes it would take from the casting its regular shrinkage. Nearly all foundries have the same trouble with shrinkage and other defects in making sewing machine and other light castings that they do with the heavy ones.

If you plunge a feeding rod to the bottom, or near the bottom of a mould, is it not possible that in withdrawing it you invite the air to follow it up and convert the metal, and what is supposed to be a shrink-hole is not a shrink-hole, but the carbon that the process separated from the metal, which, of course, naturally followed the channel made by the feeding rod? The shrinkage of a casting is quite a different thing, which don't leave a ragged hole, but on the contrary a smooth depression to be accounted for in a very different way.

Chemical kettles and similar castings weighing from forty to sixty hundred pounds are successfully cast, the metal dropped from the top through small gates, and without risers or feeding head on the casting. At the same time if a piece cut from the top side of the kettle is given to the same molder to cast on its edge he would run it from the bottom with a riser on top and churn it for all it was worth, and very likely lose the casting many times.

Many patterns sent to the foundry are marked "face down," or "cast this side down," when in reality they want all sides face sides. I have in view a particular casting from a pattern marked "face down," which was for convenience cast face up without riser or feeding, and with less than two per cent. on weight of gates, and the castings absolutely free from defects. The melting and handling the extra iron is an item to be considered at these times of two or three pounds of castings for a nickel.

MATTHEW WIARD.

Taking Apprentices.

Editor American Machinist:

I notice an article in the AMERICAN MACHINIST of May 14th in regard to the plan adopted by Trump Brothers governing apprentices. There are some things in it that are very good, and some that are not. They retain and set aside one dollar a week from apprentices' pay, and place the same to his credit in some savings bank at interest, and, if the apprentice faithfully complies with all the rules of the shop, and is not discharged for bad conduct, at the expiration of his term of apprenticeship he will be entitled to all the money so held back, and all the interest that has accrued on the same.

This cannot be done. If the boy is discharged or quits of his own accord, he can receive this money by law, as it is considered by the court as part of his earnings, and cannot be held from him. We have had some experience in this ourselves, and find that it cannot be done if the parties see fit to carry it into court. For this reason, we inserted an additional clause in our apprenticeship papers, agreeing to pay an additional sum of so much per hour for labor performed during said apprenticeship, the same to be considered as a gift if he faithfully complies with our articles of agreement.

Now, as a great many boys that go into a shop to learn the trade are poor—some have parents that can furnish them with a home, and some have none—to keep back one dollar a week, leaving them only two dollars a week to live on during the first year of their apprenticeship, is rather rough. We think to hold back fifty cents a week is enough. We know how it is ourselves, receiving only two dollars a week the first year, and had to pay two dollars and twenty-five cents per week for board. You may know that we had not much money to spend foolishly.

Taking an apprentice is rather a serious thing; it is like getting married. You take them for better or worse; and, if they prove inefficient, they are a nuisance in the shop.

Trump Brothers' plan of taking them on three months' trial is a good one; our rule is six months. Too many boys are taken as apprentices to the machine business that are not naturally adapted to it; such never make good mechanics. Take the boy that is always whittling with his knife and trying to make something, and has got a fair education, and he will come to the top every time.

BENJ. F. HETHERINGTON.

Indianapolis, Ind.

The Apprentices' Library.

Editor American Machinist:

I note your remarks on Apprentices' Library in a recent issue, and fear that your readers may be disappointed if they join the library with an idea that they will obtain access to any very valuable works on Engineering or Mechanics.

One would naturally expect that an Apprentices' Library would be well supplied with the latest works relating to the applied sciences and to the arts generally, and I have been much surprised to find that the above library contains hardly a modern work on Mechanics or Engineering. The latest novel, it is more likely to have. While I have no doubt that the latter class of works are in greater demand, I am equally certain that the former, even with their limited circulation, would do more good and increase the library's usefulness. It is a lamentable fact that good scientific works are not to be found to any great extent, in any circulating library within the reach of the masses.

If the Apprentices' Library seeks to do the most good, let it devote its first attention to such works as will advance apprentices in their trades. DISAPPOINTED BOOKWORM.

Aug. 19, 1886.

A Clyde-Built Torpedo Vessel for the Russian Government.

Considerable interest has been excited on the Clyde during the last few months in regard to a small and exceedingly curious vessel built by Messrs. James and George Thomson, Clydebank. During the time that she was being constructed and equipped with her engines, boilers, etc., she was kept under cover, thereby stimulating the curiosity of the public in a very marked manner. Eventually the fact leaked out that this remarkably novel craft was being built to the order of the Russian Admiralty, and that she was designed for use as a swift torpedo vessel. Launched a few weeks since, during which she has been subjected to a series of experimental trials for the purpose of testing her steaming and manœuvring capabilities, she has now been seen by many hundreds of persons, whose interest in her has been very much increased by witnessing her most unusual build and her remarkable speed on trial, both of which have given rise to many comments. As regards her form, we may say that she is not very unlike a large fish having a long rounded forepart which slopes downwards towards the stern in a conical form. She lies low in the water, and her deck, aft, from the conical forepart, is very much rounded, both crosswise and longitudinally.

Known as "No. 7," she is a vessel of 150 tons displacement when full with her stores and armament, her length over all being 148 feet, and her breadth 17 feet. As regards her propelling arrangements, it should be remarked that she is a twin-screw vessel, and, if not the first torpedo vessel of that type yet afloat, it is confidently stated that she is the

first twin-screw vessel of her kind that has been built in this country. Her engines are of the vertical compound type, with cylinders 14 in. and 24½ in. diameter, and 15 in. stroke; they are supplied with steam of 130 lbs. pressure from two boilers of the locomotive type, 17 ft. long and 5 ft. 3 in. diameter, each being placed in a compartment by itself. There are two torpedo tubes in the bow which are designed for discharging torpedoes 19 ft. in length · and there is likewise a torpedo tube on deck, which can be fixed on either broadside at pleasure. Her own armament proper consists of two revolving cannon, each of which is capable of firing right ahead and all round each side of the ship. She is fitted with incandescent electric lights throughout, and she has, in addition, an arc light for searching purposes. In the forepart of the vessel there is a protected conning tower, in which the steam steering gear and telegraphs for working the ship are placed. All the machinery is completely surrounded by coal, which forms a protection for it.

It may be said that the speed and manœuvring powers of this vessel constitute her most important features. When tried on the measured mile in the Gareloch last week, this little craft attained the great speed of 22 knots, or 25.33 miles per hour, or fully 2½ knots in excess of the speed asked when she was ordered. It is understood that never in any vessel built on the Clyde has such a speed been attained up till the present time. In connection with this subject we may remark that Messrs. Thomson have in hand for the Spanish Government a torpedo vessel, which is intended to beat even this record to the extent of one or two knots per hour. While "No. 7" was running on her trial, her engines developed upwards of 1,400 indicated horse-power, making 400 revolutions per minute, being equal to a piston speed of 1,200 feet per minute.

This vessel leaves nothing to be desired as regards her manœuvring capabilities, for though nearly 150 feet in length, she can describe a complete circle in 73 seconds. On the occasion of her last trial she gave most striking evidence of her speed and turning power. One of the new Clyde-built river steamers had a turn-out for a run up the Gareloch, and little "No. 7" ran after her, went completely round, stopped, went full speed astern for a short while, and again ran after the bigger vessel, circling completely round her, and finally left her astern. On the measured mile she ran full speed astern, and even in that most undignified mode of steaming she ran at the rate of 15½ knots per hour.

The designing of "No. 7" was entirely carried out at Clydebank Shipyard, and her construction has been superintended by Captain Schensnovitch, of the Imperial Russian Navy.—*Engineering.*

Sub-Marine Torpedo Boat.

Tests of a new sub-marine torpedo boat have recently been made in the Hudson river, it is claimed with satisfactory results. The boat was constructed by C. H. Delamater & Co., and is the invention of Prof. J. H. L. Tuck. She is 30 feet long, 8½ feet beam, and is 7½ feet deep. The *World* has the following in regard to the construction and operation of the craft:

"The bow and stern taper off from amidships, and the forward end of the vessel is surmounted by a dome 12 inches high, which is set with glass and just large enough for the pilot to get his head into. Admission to the boat is through a circular scuttle abaft of the dome. At the stern there is a propeller and a rudder of ordinary fashion, and two horizontal rudders with which the boat may be deflected up or down. The interior is half-filled with machinery and mechanical devices, including a powerful little Westinghouse engine. Compressed air is stored in six-inch pipes running around the interior, and arrangements are made by which air may be supplied by chemicals. A gauge registers the depth of the vessel beneath the surface. Light is furnished by an incandescent electric lamp. At yesterday's experiment, Capt. John G. Holland and Engineer John H. Kline slipped down into the iron hull and fastened the air-tight scuttle. Then the captain's head appeared in the look-out dome and the iron fish started up the river. She had not gone 100 feet before she dipped her bow into the water and gradually slid out of sight beneath the ruffled surface. The spectators anxiously watched the spot where she disappeared for three minutes, when she reappeared about a quarter of a mile to leeward and headed towards them. The Sylvan Glen was coming down the river only a few hundred feet above, and her captain was much surprised at the sudden appearance of the iron monster. He tooted his whistle vigorously and put his wheel hard aport, whereat the torpedo boat kicked up its heels and again disappeared.

The Peacemaker reached a depth yesterday of forty feet and attained a fair rate of speed. The torpedo portion of the experiment was not tried. It is designed to use two torpedoes attached together by a chain and fastened to corked magnets, which will attach themselves to the iron or steel sheathing of a vessel to be destroyed. They are to be fired by electricity after the torpedo boat has reached a safe distance. Prof. Tuck is working on a device by which he claims the occupants of the boat will be enabled to leave it at a depth of forty feet and return again in safety.

"Patents on the sub-marine vessel have been secured in the United States and throughout Europe. A company has been formed under the laws of this State, with Roosevelt Schuyler as President."

Extemporizing Straight Edges.

A mechanic often wishes to extemporize a straight edge from a piece of board, in order to do an off-hand levelling job, and considerable time must be spent in jointing up a strip of board and getting both sides precisely parallel. In fact, this operation is a hard one. It can well be accomplished only by getting out three straight edges, much in the same way that surface plates are evolved.

A straight edge may be extemporized by jointing one edge of a board, then marking in center of board a line parallel with the jointed edge. Get out a strip of board and nail or screw to the straight edge in such a manner that the upper edge of the strip coincides with the mark before mentioned. The level may be placed upon this nailed on strip, and the levelling job finished long before a straight edge could have been finished.

In fact, quite a long distance may be accurately levelled with any board or plank that may chance to come to hand, no matter whether it be straight, crooked or taper. The only points are to place the level on top of the board in exactly the same place every time the level board is used, and the board must also be turned "end for end" also, and the last levelling must be made with the board turned in an opposite direction from what it was when the first length was levelled.

To Do Away with Postmen.

The *Mail and Express* has been trifling with science with the following results:

"In 1986 such a thing as a postman or a carrier walking ten or fifteen hours a day delivering mail matter will never be heard of, for the simple reason there will be none in existence then," remarked a scientific man the other day to a *Mail and Express* reporter.

"How will the mail be delivered?"

"Everything will be reduced to a fine system, and a letter will be delivered in three seconds after its arrival in the post-office. Each house in a big city will be connected with the general post-office or branch station, as the case may be, with a pneumatic tube large enough to carry a good-sized package. At present such a system of delivery cannot be put into practice because it would be too expensive. A century hence civilization will rise to such a high and prosperous point that a system of quick delivery by means of pneumatic tubes will certainly be in vogue. It could be done now, only it would bankrupt a city. The tube from Twenty-third street to the Western Union building shows how nicely it works. A letter or telegraphic message takes just two seconds to go the two and a half miles. The quickest means of transit are sure to be adopted in the long run. It is the evolution of progress and nothing can stop it short of the universe. Not only will private houses have these tubes, but all of our large cities will be pneumatically connected. Chicago will be perhaps ten seconds by letter from New York and San Francisco a minute or so. It will change a great many things, and do away with the steam cars as a mail carrier. The system is yet in its infancy.

"New York will by that time have a new system of sewers, much better than Paris now, and the tubes can be run along in them instead of having to dig up the earth, as is the case with gas and steam pipes at present. The postage on letters will not be one-twentieth what it is, and the expense to the Government will be less. Of course the deliveries will have to be regulated to so many during the day. Say five or ten in the morning and that number in the afternoon and evening. And yet human nature is so constructed that even with such improved facilities I believe many kickers could be found who would protest against the limited number of deliveries of mail and the slow time made. All these things will come to pass, and it takes no prophet to plainly see the handwriting on the wall. The overworked carriers will have a long rest."

Defective Boiler Fittings.

An upright boiler, in use without a steam gauge, was rather nervously noted during a visit to a machine shop. A steam pipe which supplied the engine extended up from top of boiler, ran across a passage-way, and descended again to about level with boiler water line. At this point the steam pipe led off to the engine through a T fitting, and a continuation of the direct steam pipe below this T served to drain off water of condensation as it came over from the boiler. A ½-inch pipe tapped into the above-named drain pipe was connected with the only steam gauge used about the boiler, and just below the steam-gauge connection; at lower end of direct steam pipe was a valve which was kept partly open to allow water to escape.

Although the boiler was fitted with two safety valves, the steam-gauge connection was not conducive to much confidence in "somebody's" engineering ability. A steam gauge should be connected direct with the boiler, and that connection should be short, sharp and decisive.

Breaking Car Axles.

Recent tests of some master car builders' axles, which had been used on the N. Y. C. & H. R. R. R., resulted as follows: With the axle placed upon supports 3 feet apart, equidistant from center of axle, a weight of 1,600 pounds dropped 10 feet upon center of axle invariably broke the axle at junction of journal and wheel seat. Although there is a filleted corner at this place it proved the weakest point every time. Annealing the axle prevented its breaking by the above test.

We have frequent inquiries regarding various institutes of technology, particularly as to the text books used, and the proficiency requisite for admission; also as to the proper party to address for the desired information. All the information asked for will be gladly given by the institution manual, and no further address is necessary than the name of the institute and its location.

Inventions Wanted.

Defective flues, says *Invention*, burned about 2,750,000 dollars' worth of property. Wanted—a flue that cannot be defectively constructed.

Defective heating apparatus burned nearly 500,000 dollars' worth of property. Wanted—heating apparatus that cannot prove defective.

Electric wires and lights, a source of increasing danger, burned over 250,000 dollars' worth of property. Wanted—a system of insulation that cannot prove faulty.

Explosions of kerosene lamps burned over 1,500,000 dollars' worth of property. Wanted—lamps and lanterns that cannot explode.

Lightning burned 1,250,000 dollars' worth of property. Wanted—a perfect lightning rod.

Sparks from locomotives and other sources burned 2,000,000 dollars' worth of property. Wanted—a spark arrester of genuine merit, or stoves and furnaces in which combustion is more nearly perfect.

Gas jets burned 1,250,000 dollars' worth of property. Wanted—a device for preventing the contact of goods and curtains with open gas burners.

These are a few of the most necessary inventions; but others are needed also. For example, there is a demand for a cigar that will extinguish itself before it is thrown away, also a plan for paralyzing incendiaries as soon as they decide to wield the torch. Another required invention is an automatic contrivance to pillory tramps before they enter barns and granaries. Still one more device, perhaps the most necessary of all, should not be forgotten, namely, a device for inoculating careless owners or occupiers of property with the spirit of carefulness, or of trepanning their skulls with the sense of watchfulness.

Backing Out Keys by Gunpowder.

In our issue of October 25, 1884, we published a description, by a well-known mechanical engineer, of a "Gun for Driving or Backing Out Heavy Keys." Referring to the same device, the *Boston Journal*, of a recent date, says·

An Eastport, Me., engineer has been in the habit of using a novel contrivance to loose keys and wedges on large pieces of machinery in steamboats when the space around the machinery was too contracted to work with ease. He made a small mortar, carrying an elongated bolt, which struck the key head without entirely leaving the gun, which was perforated at the sides, well forward, with holes through which, after the bolt had passed, the charge escaped. The force required was regulated by the quantity of powder used. The apparatus proved highly successful, and recently, in taking out and putting in the New Brunswick's shaft, it was loaded and discharged about a hundred times. By its aid several days were saved in doing the work on that steamer.

At the recent Wimbledon rifle meeting Signor Giulio Dalumi, of the firm of Dainesi & Co., gunsmiths, Milan, brought under the notice of the authorities a novel method of enabling a marksman to ascertain instantly and under all circumstances whether in taking aim his rifle is being held perfectly plumb. The invention consists in the employment of a tiny spirit level fixed at the bottom of the sight-gauge so as to be amply protected from injury, and at the same time always visible to the marksman. The position of the bubble of air indicates automatically and unerringly to the shooter in what position he is holding his weapon, and thus enables a much truer aim to be taken than is possible to the average marksman. The plan has the merit of perfect simplicity, no alteration or cumbrous addition to the existing mechanism of the rifle being needed, and, when once fixed, absolutely no attention being required to keep the level in working order. The War Office officials, to whom the invention has been shown, have expressed approval of it, and there is every probability of its being practically experimented with. — *The Universal Engineer.*

A manufacturer in Chicago is building a factory, says the *Northwestern Lumberman*, and will put in it a good many thousand feet of gum flooring. He believes that for flooring gum is one of the best woods in existence. Its interlaced fiber will prevent it from sliver-ing and splitting, and its fineness of grain will insure an extraordinarily smooth surface from wear. Gum timber may prove to be good property. At present it can be bought for a song.

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The National News Company, New York, N. Y.
The Newark News Company, Newark, N. J.
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The New Orleans News Company, New Orleans, La.
The New York News Company, New York, N. Y.
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The San Francisco News Co., San Francisco, Cal.
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The Toronto News Co., Toronto, Ontario, Canada.
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EDITORIAL ANNOUNCEMENTS.

☞ *Positively we will neither publish anything in our reading columns for pay or in consideration of advertising patronage. Those who wish to recommend their wares to our readers can do so as fully as they choose in our advertising columns, but our editorial opinions are not for sale. We give no premiums to secure either subscribers or advertisers.*

☞ *Every correspondent, in order to insure attention, should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery, nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draftsmen, and all those specially interested in the occupations we represent, on subjects pertaining to machinery.*

☞ *Subscribers can have the mailing address of their paper changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once.*

NEW YORK, SEPTEMBER 11, 1886.

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Tariff and Other Matters in Australia.

A number of talks with John Buncle, a veteran machinery manufacturer of that great island-continent, develop some points of information regarding Australia that our readers may appreciate.

Australia is composed of five colonies, of which Victoria is the smallest, the superficial area of the latter being, however, only a little less than that of Britain itself. The colony of Victoria early adopted the policy of protecting its infant manufactures from foreign competition by means of a tariff, and the natural result has followed. The colony, as a manufacturing country, now occupies a far higher position than any other colony of the Australasian group. In 1884 there were in the colony of Victoria 144 establishments engaged in building machines, tools and implements, and the total number of manufacturing establishments enumerated was 2,777, of which number 1,272 used steam engines, with a total horse-power of 17,602. A total number of 46,857 hands was employed, the value of lands, buildings, machinery and plant so employed being £9,414,527, or about forty-five millions of dollars. We understand the rate of duty levied on articles imported is 25 per cent.

The success of the protective system of Victoria in building up manufacturing industries, and developing the resources of the country, after a few years induced some of the other colonies to consider the tariff question more seriously. A large part of the people in all the colonies were of British birth or descent, and naturally disposed to favor British ways of looking at things. But, finding themselves rapidly becoming buyers of Victoria goods, while themselves deriving none of the benefits of the protective system, a change of views soon led to the adoption of a similar tariff system in the great central colony, known as South Australia. A "revenue tariff" system was also adopted in the other colonies of New South Wales, West Australia and Queensland.

The colony of Victoria, naturally enough, now favors the establishment of a system of reciprocity among all the colonies, with the protective system as a means of sheltering all alike from competition with older and richer countries, in which manufactures have been long established. The growth of public sentiment in favor of a more substantial tariff bids fair to bring the other colonies to the same way of thinking, which is certainly a sensible way of thinking, according to American ideas. Probably no country under the sun can hope to derive greater benefit from a protective tariff policy than a far-distant continent like Australia, its territory stretching 3,000 miles one way and 2,000 miles the other, sparsely populated, and with its resources largely undeveloped. While Mr. Buncle individually is a loyal subject of the Queen, what astonishes Americans in his statement of the case is not merely that such a policy should find any influential opponents, but that public sentiment does not also favor welding the colonies together into another United States of America, or United States of Australasia. Division of sentiment regarding tariff questions has been the chief means of keeping the colonies apart in the past; but as they progress toward agreement under a policy of protection and reciprocity, the desire for union of interests may be expected to gain ground.

In Victoria, the railroads and telegraphs are all owned and operated by the Government, the railroad mileage of the colony aggregating about 1,675 miles. The whole five colonies contain about 7,500 miles of railroad.

On his return home, Mr. Buncle intends to address his countrymen regarding a number of improvements, which have been suggested by his visit to this country, and which he believes they would find it advantageous to adopt. One of these is the substitution of the American system of dollars and cents in currency nomenclature for the cumbrous English system of pounds, shillings and pence. He cannot see, either, why other reforms in nomenclature should not be adopted, as, for example, stating weight in pounds, instead of in "stone," or stone and pounds.

The systems of manufacture hitherto in vogue, he thinks, can also be changed with marked advantage, to accord more with those practiced in this country. The specializing of industries and adoption of automatic machinery, of course, form the principal features of this plan. It is Mr. Buncle's intention, on his return to Australia, to set his brother manufacturers a wholesome example in this latter direction.

Angus Sinclair, editor of the *National Car and Locomotive Builder*, recently returned from a trip to England and Scotland, where he has been spending some weeks. Mr. Sinclair learned and followed locomotive engine running in Scotland, and afterward followed it for some years in this country; one object of his visit was to note present railroad practice in motive power in Britain in comparison with that of the United States. From conversation with him we infer that while he finds much to commend in British practice, he does not think American practice will suffer by comparison. He believes the large driving wheels in use there are not an unmixed blessing, but with the comparatively few stops made on their roads they are not open to the same objections that they would be here. Their practice in using large truck wheels, he thinks, should be more extensively copied here.

Mr. Sinclair is somewhat non-committal as to the merits of the Webb compound locomotive, but speaks quite highly of the performance of one of them, upon which he was permitted to ride through the courtesy of Mr. Webb.

Regarding shop practice in connection with railroads, he thinks that of the best American shops superior, except in the instance of handling heavy work. In this respect he says American shops are much behind those of England and Scotland. He expresses himself as finding much less done there than here in the way of standardizing, working to templets, and bringing about interchangeability of parts.

The United States Letter-Sheet Envelope.

The Government has done a good thing in issuing the new letter-sheet envelope. It is at once a stamped envelope and a letter sheet, and will be found particularly convenient for travelers. It is complete, even to the "If not called for in ten days" clause. They are sold at the rate of twenty-three dollars per thousand, either separately or in pads of 25, 50 or 100. The price, as will be seen is scarcely more than postage.

Literary Notes.

THE SHOP COUNCIL. BY J. C. BAYLES. PUBlished by David Williams, 66 Duane street, New York.

The author of this little work discusses the relations between employer and employe, so far as he takes occasion to refer to them, in a thoroughly unprejudiced manner. In this respect he disarms criticism, and places what he has to say squarely upon its merits. Whether the reader, to whichever side he belongs, agrees with him or not, he will look in vain for learning in either direction. This is fortunate, because it is almost invariably the case that literature relating to labor and capital is so palpably biased as to render valueless whatever of good there may be in it.

In the beginning of the book the objections to arbitrations are set forth. These, in the opinion of the author, are, first, the objections of the employer to make public his private business matters, or surrender to outside dictation what he believes to be his rights. Upon this point the author says:

He knows that a board of arbitration cannot intelligently decide any question affecting his interests, or those of his workmen, without a knowledge of facts which he cannot impart without laying before them his books, and giving to those who have no right to it information which might be used to his disadvantage. He is unwilling to declare his profits, or confess his losses; to proclaim his manufacturing costs or publish the secrets of his business; and without such an exposition of his affairs a board of arbitration cannot intelligently decide any issue of consequence to him or the men employed by him.

It must be admitted, even by those most enthusiastic in their efforts to bring about arbitration as a rule, that this is a grave objection, against which it is extremely difficult to frame an argument. It is one that has always been feared by all friends of arbitration.

The second objection set forth is that of labor. In reference to this we clip the following:

It [labor] distrusts arbitration at the hands of a board so constituted as to be acceptable to employers, fearing that its representatives in such a board would be overmatched by men of broader education and larger experience, whose sympathies would naturally incline towards the employers. Exaggerating the power of organization, they look to the trade union to dictate in matters affecting the welfare of labor, and it rarely happens that workmen having an organization of their own are willing to submit to arbitration any question at issue between themselves and their employers, especially under circumstances involving an agreement to abide by the decision reached.

We think the author quite overestimates the strength of the objection to arbitration on the part of workmen. We have seen little reason to doubt that in the majority of cases, and in the beginning, they would be willing to submit to arbitration if fairly met by the employer. It is natural that this should be so. The workman has little or nothing to lose in making public his relations to his employer. If this were all the employer were required to make public, then arbitration would, beyond much doubt, succeed.

Dismissing arbitration for the present as impracticable, the author, after referring to misunderstandings likely to arise between employer and employe, and to the "ideal industrial relation," which he compares to that which exists in the family, proceeds to outline his plan for maintaining harmonious relations between those who pay and those who receive wages. Want of space forbids more than a very brief outline of this. He shows that the "shop council," which he proposes, "is not a board of arbitration," the latter term implying a decision binding upon the parties, while a council is simply an advisory board The "shop council" may consist, ordinarily, of five members, two appointed by the manufacturer, two elected by the workmen, and the fifth elected by the four. There will also be a permanent clerk, who will have no vote, nor voice in the deliberations. Before this council, in a manner clearly outlined, matters of difference may be brought. There will, of course, be nothing final in the decision of this council, but each side agrees to hear and consider the report of the council before proceeding to extreme measures.

The shop council, the author concludes, would have an educating influence on both parties, each becoming, as it were, better acquainted with the other, the result being mutually beneficial. His conclusions in this respect are entirely within reason. The tendency is in the direction at least of the old-time relations, when the employer was personally acquainted with every man he employed, and when there was much of mutual sympathy.

Mr. Bayles is a believer in the necessity of trades unions, but thinks that one of the most important results of the shop council would be to do away with the necessity for using them to redress minor grievances. In regard to this the following is happily put, and worth consideration:

A columbiad would undoubtedly kill a sparrow if its projectile hit him, but it is not a suitable weapon for sparrow-killing. Its shot is quite as likely to miss the sparrow as to hit him, and if once set in motion there is no telling what other destructive results it may accomplish besides that intended. * * * The wise commander never trundles his siege train out to the skirmish line, and for the same reason the power of organized labor should not be employed to regulate matters which can be, and ought to be, settled in the shop in which they originate.

We regret our inability to notice further this little work, which we confess to having read with unusual interest.

We hope that every workman and every employer of labor in the country will read it carefully. Those, if there are such, who do not agree with the author as to the efficacy of his plan for settling differences will not fail

to find things in it worth thinking about. It is sold, single copies for 10 cents; fifty copies for $3; one hundred copies, $5.

"Poor's Manual of Railroads for 1886" has been issued by the publishers, H. V. & H. W. Poor, New York, and contains a number of new features. The old system of classification by States is discontinued, owing to the difficulty of so classifying the numerous railroad "systems," which nominally are tributary to some one State, but really control the business and politics of several States. Tables showing the prices of railroad stocks and bonds for a term of years, and their fluctuations, form a new feature that will be specially interesting to many persons, investors, mainly, however. A table of dividends is also added.

Acknowledgment is made in the Manual of the useful results which have followed the establishment of railroad commissions in a number of States, in the way of greater fullness and uniformity in railroad reports. It is a hopeful sign to find such a standard publication as "Poor's Manual" speaking favorably of railroad commissions. The time is coming when sound railroad men everywhere will bear equal testimony to their value. We believe the establishment of a National Railroad Commission, modeled after the plan of the State commissions, which are now doing such good work, is to-day needed by the railroads quite as much as by the public.

The publishers of "Poor's 1886 Manual" are entitled to great credit for collecting the mass of information which is contained in the thousand pages before us.

We hope they will favor us next year with some additional tables, mechanical in their nature, showing the number and kinds of locomotives in use, location of shops and number of men employed, and the like.

The *Mail and Express* (New York) shows abundant signs of good healthy growth. Only one year ago they put in operation two new Hoe presses, which would turn out 60,000 copies per hour of their four-page edition. But they have already outgrown their facilities, and have under construction a Hoe double press which will print and fold 60,000 four-page or 30,000 eight-page papers per hour. When this is completed they will be able to print and fold 120,000 papers per hour.

QUESTIONS AND ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common-sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials nor location will be published.

(323) C. P., Wilmington, Del., writes: In your issue of Aug. 28, in an article on the holding power of boiler tubes, you speak of the tubes being set in the ordinary way. Now, sometimes the tubes are beaded, and sometimes they are not. How was it in this case? *A.*—Both ends beaded.

(324) Carels Freres, Belgium, ask: 1 What is the best method for tinning and babbitting cast iron? *A.*—In our issue of Aug. 1, 1885, a very excellent plan is described. 2. What is the best composition of lining metal for various purposes? *A.*—We do not know of anything better than the original babbitt mixture, which was prepared by melting 4 lbs. copper, then adding by degrees 12 lbs. Banca tin, and 8 lbs. regulus of antimony, then 12 lbs. more of tin. This is the hardening metal. One pound of this metal is melted with 2 lbs. of tin, which makes the lining metal.

(325) V. M. B., Penryn, Cal., writes: 1. What is the power of an engine 2½ 'x5", running 400 revolutions, steam pressure 150 lbs.? *A.*—If properly constructed, about 3½ horse-power. 2. Is 400 revolutions the proper speed for such an engine? *A.*—It will be about right. 3. Can you give me any information as to size and construction of an oil burning boiler for such an engine? *A.*—We have not enough data as to oil-burning engines to advise you satisfactorily.

(326) W. F. M., Birmingham, Ala., asks: When was the first number of the AMERICAN MACHINIST published, and can I obtain the back numbers? *A.*—The first number of the AMERICAN MACHINIST appeared in November, 1877. Some of the earlier numbers are out of print, and can be obtained only by finding those in possession who are willing to dispose of them for a consideration.

(325) F. M. will find an illustrated article on putting up shafting in the AMERICAN MACHINIST of Nov. 1, 1879.

(326) We should advise J. P., Hartford, Conn., to try type metal for pouring nuts for fine threads, instead of lead.

(327) S. A. S., Evansville, Ind., writes: A water tank is situated 60 feet above the ground, and is fed by a 3" pipe running straight through the bottom of the tank. Will there be any difference in the pressure of water against the pump if the pipe discharges just inside the bottom of the tank, or if it continues to the top of the tank? *A.*—You can calculate the head of water from the head of the pipe or tank, whichever is highest. If the pipe discharges into the bottom of the tank, the head will be the level of water in the tank. If it discharges into the top of tank, the head will be the elevation of the tank. The size of the tank or of the discharge pipe does not enter into the calculation, except that as the friction will be greater with a small than with a large pipe.

(328) H. S. T., Owensboro, Ky., writes: A short time since I had to set a hot-water pump, to be driven by an eccentric on an overhead shaft. I set the pump directly under the center of the shaft, but the owner of the mill said I should have set it out of line to the extent of one-half the throw of the eccentric. Which was right? *A.*—You were right.

(329) W. F. B., Chicago, Ill., writes: 1. I want to make some castings of metal that expand in cooling. Can it be done? *A.*—Use lead, 75 parts; antimony, 16.7 parts; bismuth, 8.3 parts. 2. How much will a piece of bronze or composition metal expand when heated from 32° to 212°, the dimensions being ¼" diameter and 12" long? *A.*—According to Trautwine, the expansion will be ⅛" in 5.66 feet. This would be about 1-40" in 1 foot, and in the same proportion for ¼".

(330) J. W., Wahoo, Neb., asks: 1. Where can I get a mercury gauge for testing steam and hydraulic gauges? *A.*—You will probably have to make one. To go through the range you want the mercury column would have to be several hundred feet in height. 2. What is the best steam engine indicator? *A.*—We do not know of a poor one in market; some prefer one, others another.

BUSINESS SPECIALS

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Shafting Straighteners. J. H. Wells, Tampa, Fla.

Patent Att'y, H. W. T. Jenner, Washington, D. C.

J. Clayton, Air Compressors, Rock Drills, 43 Dey st, NY

Edw. Sears, Wood Engraver, 169 William st., N.Y.

Steel Name Stamps, etc. J. B. Roney, Lynn, Mass.

Korting Exhaust Steam Condenser. Send for descriptive catalogue K. A. Aller, 109 Liberty st., N.Y.

Tack, Wire and Shoe Nail Machinery. Wm. A. Sweetser, Brockton, Mass.

The Best Upright Hammers run by belt are made by W. P. Duncan & Co., Bellefonte, Pa.

Light articles built to order by the American Sewing Machine Co., Philadelphia, Pa.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Pattern and Brand Letters. Vanderburgh, Wells & Co., cor. Fulton and Dutch sts., New York.

20", 25," 28" B.G. and S. F. upright drills for immediate delivery. Currier & Snyder, Worcester, Mass.

Selden Packing, for stuffing-box, with or without rubber core. Randolph Brandt, 38 Cortlandt st., NY

Veneer machines, with latest improvements, Farrel F'dy & Mach. Co., Ansonia, Ct. Send for circular.

120 ice and refrigerating machines, all successfully built by David Boyle, 521 Monroe st., Chicago, Ill.

Machinists' supplies, brass goods, m'f'rs supplies, polishing materials, shafting, light mach'y., etc; in any quantity. Jordan & Gottfried, 208 Canal st., N.Y.

Curtis Pressure Regulators, Curtis Return Trap. Curtis Damper Regulator. See Sept. 4, p. 10. Send for circular No. 17. Curtis Reg. Co., Boston, Mass.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large; prices low. Frasse & Co., 62 Chatham st., N. Y.

Infringement of patent—Suit pending against mfr. imitation "Eureka" Packing. Dealers just as liable as mfr. Get genuine, with red label, from Hine & Robertson, 12 Cortlandt st., N. Y.

"Hints to Steam Users, Engineers and Firemen." A 100-page book on care of steam boilers; just issued; containing useful rules, tables, etc; a valuable book for engineers; sent on receipt of 25 cts. n stamps. J. N. Mills Pub. Co., 30 Vesey st., N. Y.

St. John Improved Self-adjusting Cylinder Packing, for marine and stationary engines and locomotives; applicable to water, air, oil and ammonia pumps. For durability and minimum of friction, it is unexcelled. Send for pamphlet. Address, Balance Valve and Piston Packing Co., room 58, 280 Broadway, New York.

Patent Binders for the AMERICAN MACHINIST, holding a complete volume (52 issues), simple, neat, durable. Price $1, prepaid, to any part of the United States by mail. To Canada or foreign countries the price will be 75c.; purchasers pay express charges and customs duties. AM. MACHINIST PUB'G CO., 96 Fulton st., N. Y.

"Indicator Practice and Steam Engine Economy." By F. F. Hemenway. Contains plain directions for using the indicator, and making all required calculations from the diagram; also the principles of economy in operating steam engines, and current practice in testing engines and boilers. Price, $2 post-paid. Published by John Wiley & Sons, 15, Astor Place, New York.

MANUFACTURES.

E. Broad & Son, St. Stephen, Me., are enlarging their axe factory.

The Columbia (Ohio) Glass Works Company are building a large addition to their works.

The Crystal Shear Co., Southington, Conn., are building an addition to their foundry.

The Colorado Midland Railroad Co. intend to build shops at Colorado Springs, Cal.

Dick & Myers will build an $18,000 boiler house at 7 North Eighth street, Brooklyn, N. Y.

N. P. Freeberg, 75 Bergen street, Brooklyn, N. Y., will build a $13,000 carriage factory.

F. Herhold, 160 West Erie street, Chicago, Ill., will build a $25,000 chair factory.

Horace Inman, Amsterdam, N. Y., is building a large boiler and engine room.

James Siegfriend, Bethlehem, Pa., will build a cider mill to be run by steam or water power.

Cargill & Thomas, Castile, N. Y., are building a steam evaporator.

The C. P. Jones Mfg. Co., Lyme, will move their music rack factory to Ivoryton, Conn.

The Lowell Mfg. Co., Lowell, Mass., will build an addition to their mill buildings.

J. D. Mulrinnan, Lincoln Center, Me., is fitting up a lumber manufactory at that place.

M. H. Jackson is building the dam for a woolen mill on Carlton stream, Sangerville, Me.

John D. Murphy, Chicago, Ill., will enlarge his boiler shop.

The Shenandoah Machine Company, Sharon, Pa., will build an addition to their machine shop.

C. G. Wilson & Co. are erecting a spark arrester factory at Milledgeville, Ga.

The Erin Lumber and Manufacturing Company, Erin, Tenn., will enlarge their factory.

It is expected that the iron works at Pembroke, Me., will soon be put again in operation.

A new shingle and clapboard mill is being built at Haynesville, Me., by Joseph O. Patchall.

The Banfield Machine Shop, Presque Isle, Me., is just about starting up equipped for general job work.

C. R. Merrill will build a basement factory and warehouse at 275-287 S. Canal street, Chicago, Ill. Cost, $8,000.

The mill and machine shop of the Ducey Lumber Company, Muskegon, Mich., have been recently burned.

The Green Mountain Pulp Company, Middleburg, Vt., will put in new water-wheels and make other extensive repairs.

D. J. Curtis, Springfield, Mass., will build a four-story brick mill, 296 feet long, to cost $75,000, for the Hockanum Company, Rockville, Conn.

Work is being begun in the shops of the Jacksonville, Tampa and Key West Railroad, at Palatka, Fla.

The Greylock Mfg. Co., North Adams, Mass., will build a 50x100 foot addition to their mills. They will also make other improvements.

The Morris Building Co., 26 Broadway, New York, will build a five-story terra-cotta and brick factory on Ryerson street, Brooklyn, N. Y.

Richard Paillon, 36 East Thirty-Eighth street, New York, will build a $5,800 saw-mill on Henry street, Brooklyn, N. Y.

The Delaware, Lackawana & Western Railroad have purchased land at South Orange, N. J., upon which they will erect a round-house.

Homer Ramsdell is building a propeller at Newberg, N. Y. The vessel will be 212 feet long, and have compound engines of 1,000 horse-power.

Cron, Kills & Co., Piqua, Ohio, are erecting new furniture works at that place. The buildings will be 150x50 feet, three stories high.

The Shaw Stocking Company, Lowell, is preparing to erect an addition, 300x42 feet, to their mill on Smith street.

Orville H. Short, Syracuse, N. Y., will rebuild his extensive wagon works which were recently destroyed by fire.

Waterville, Me., has on foot a project represented by P. S. Heald and others, to put in a steam-heating plant to serve nearly 100 buildings from one generator.

The Union Dry Dock Company, Buffalo, N. Y., are to build a steel steamer 335 feet in length over all. She will carry 3,000 tons of freight, and cost $225,000.

Galena and Elgin, Ill., want water-works; also Wabash, Ind., Martin's Ferry, Ohio, and Belfast, Maine are taking active steps to procure more water.

James Robertson & Co., Baltimore, Md., will rebuild their lead pipe and shot factory on South Howard street, reported as burned. The new factory will be 85x150 feet.

B. W. & H. F. Morse, Bath, will commence work next month upon their big five-masted schooner. Pattee & Rideout have completed her model. She will be the largest schooner ever built for salt water service.

The Portland Stoneware Co., Portland, Me., are enlarging their plant for the manufacture of salt-glazed, vitrified sewer pipe for the cities of Boston and Lowell.

Hughes Bros., steam pump works, Cleveland, O., have issued their "1886" catalogue of steam pumps. They make an assortment of pumps for all ordinary purposes.

M. Raon, Whitewater, Wis., intends to move his foundry and mower works to Delavan. He has bought the pump foundry at that place, and will erect an addition to be used as a machine shop.

The Hockanum Company, Rockville, Me., have hoisted up their Springville mill, and are getting ready to move it to another site. This company will probably build a large mill at an early day.

It is stated that the Essex Center (Mich.) Mfg. Co. desire to remove their works to some place possessing better shipping facilities. This company, among other articles, make large numbers of steel planes.

Handren & Robins, proprietors of the Albany Street Iron Works, New York, have taken an extended lease of the Erie Basin Dry Docks, South Brooklyn, formerly managed by Messrs. J. E. Simpson & Co., the builders.

All the machinery, tools and stock of the Warren Fire Escape Co., late of Warren, Ohio, manufacturers of Johnson s patent portable and stationary automatic fire escape, have been removed to Baltimore, Md., where the manufacture will continue with increased facilities under the new name of Warren Fire Escape Co.; office, No. 5 German street, Baltimore, Md.

James Simpson & Co., the English manufacturers of the Worthington pumping engine, report having just secured an order for an 18,000,000 engine for the West Surrey Station of the London Water Department. We are informed that Simpson & Co. are meeting with success in introducing this form of engine, this order being one of several that they have received during the last few months.

A Minneapolis, Minn., journal says: Col. James Goodnow, whose mill was destroyed by fire some weeks ago, has finally had his insurance fully adjusted, and is overhauling the wreck and planning a new mill which he will proceed to build forthwith. It is hoped that the foundations will prove uninjured and the boilers intact, but the engine is ruined. Col. Goodnow expects to have the new mill running by next spring.

It is stated that the works for the Anglo-Pacific Steel Co., soon to be built at San Francisco, Cal., will include a wharf 62 feet broad, 400 feet into the bay; cranes, furnaces, steam hammers, forges, and all other apparatus needed for a first-class plant are to be provided, and the works are to cover the widest range, from horseshoe nails to armor-plates and crank-shafts for ocean steamers.

The work of building the new foundry for ordnance purposes will be begun at the Washington Navy Yard as soon as the requisite plans can be prepared at the Navy Department for the purpose. The first important work at the new foundry will be the manufacture of steel guns. The cost of the foundry will be $250,000, and, when completed, will be the most complete establishment of its kind in America. All the material, tools, etc., now useless, will be sent by water to other navy yards.

The Pittsfield Steam Power Company, Pittsfield, Me., with $20,000 capital, says the Boston *Journal of Commerce*, Michael J. Cary, president, and Levi A. Stevens, secretary, has filed its certificate of incorporation. There is good prospect that the company will have as a tenant a large silk manufacturing concern from New Jersey, who are now in correspondence with the company. The silk mills already in the town had their eyes on the same building. The company owning the property offer it to manufacturers at a very low figure, and that for a term of years. The building is 3½ stories high, 200x50 feet, with steam power at hand.

W. P. Davis, North Bloomfield, N. Y., writes us: The fire that occurred at our works on the 19th inst. has not stopped our running, nor will it make any difference with prompt shipment of all orders. We shall have all in perfect order this week. Had we not checked the fire just as we did it would have been of much damage to us, as we have 100 machines well under way, 50 of which will be finished this week. We would like to have all our patrons know that they can depend on prompt shipment of all orders.

The Warren Woolen Company, Stafford Spring, says the *Boston Journal of Commerce*, has changed its pay day from the first to the middle of the month, and hereafter will settle with its employes the Saturday after the 14th in each month. For several years the company, in common with others in town, kept payments one month in arrears. But one company in town holds to the old system, that one paying the last Saturday in each month. The weekly payment system has been tried by several mills but proved unsatisfactory to both employer and employe.

S. B. Amidon has already begun operations on the site of his recently burned machine shops at Staffordville, Conn., and will put up a two-story wooden structure, 60x104 feet, with the necessary outbuilding for his foundry work. He will put in the best makes of iron-turning and shaping machinery, as well as wood-turning machines of all kinds, saws, etc. These new shops, together with the new woolen mill Rawitser & Bro. think of building soon, and the old Hope mills under their proprietorship, it is thought will bring back to Staffordville a good share of her former prosperous aspect.

Machinists' Supplies and Iron.

NEW YORK, Aug. 26, 1886.

Although no new features are visible in the market there is every indication of a good future business, and it can be safely predicted that business will be "booming" in course of a very few months. Nearly all classes of manufacturers are very busy at present, and immediately their stock on hand is consumed large orders must be placed, which will put an end to the day by day buying now practiced.

Iron—In American pig the market is still quiet, with the same hand-to-hand transactions which have occurred for months past, and will probably continue for several weeks yet. We quote Standard Lehigh and North River brands $18 to $18.50; No. 2 X Foundry, $17 to $17.50, and Grey Forge, $16 to $16.50, with outside brands obtainable at about 50c. to $1 per ton less.

Scotch Pig—The demand continues moderate. We quote Coltness, $20; Glengarnock, $19; Gartsherrie, $19.50; Summerlee, $19.50; Eglinton $17.50 to $18; Langloan, $19.50; Dalmellington, $18.50.

Lead—4.75c.

Antimony—Hallett's, 7¾c.; Cookson's, 9c.

✻WANTED✻

"Situation and Help" Advertisements only inserted under this head. Rate, 30 cents a line for each insertion. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Wanted—Situation as metal pattern-maker; can do designing; 15 years' experience. Metal Patterns, AM. MACHINIST.

Wanted—Situation as foreman boiler-maker; best of references. Address Boiler-Maker, care AM. MACHINIST.

Situation to travel for machinery establishment as salesman, or take charge of machine shop, by competent man. Box 23, AM. MACHINIST.

Wanted—Situation as foreman blacksmith; experienced on marine engine boiler, heavy and light machinery, forging; references given. Address P. O. Box 307, Olneyville, R. I.

Traveling salesmen handling engineers' and mill supplies, can make desirable arrangements to sell "Eureka" packing. Special pocket-book of samples furnished. Hine & Robertson, 12 Cortlandt st., N.Y.

Mechanical engineer and draftsman, with eleven years' practical experience in designing and construction, is open for engagement; correspondence solicited; references given. Address Mechanical Engineer, AM. MACHINIST.

A young man, with nine years' thorough shop experience in regular and special machine tool construction, desires correspondence with parties who may be in need of superintendent or mechanical expert. Box 61, AM. MACHINIST.

Wanted—A first-class working foreman in shop in N. Y. City; 15 men; must be first-class workman on interchangeable machinery; able to handle work and men, and must be quick; build light machinery and tools. Address, stating experience, etc., Box 28, AM. MACHINIST.

Wanted—Foundry foreman; one of experience in large engine work; must be thoroughly competent in the work and the handling of men; must be strictly temperate; to the right man steady work with fair salary will be given. Address, with references and experience, H. O. R. Co., AM. MACHINIST.

✢ MISCELLANEOUS WANTS. ✢

Advertisements will be inserted under this head at 35 cents per line, each insertion.

Crescent solid lubricant, clean, durable, cheap; prevents hot boxes. Crescent Mfg. Co., Cleveland.

The Crescent automatic grease cup is adapted to every service. Crescent Mfg. Co., Cleveland, Ohio.

Steel stamps, stencils, burning brands, and brass checks. T. M. Parker, Hartford, Conn.

Light mach'y of all kinds built at short notice. Edmund Mills, 8 Dey st., Jersey City Heights, N. J.

Wanted—A party to manufacture the bench hook illustrated in this paper Sept. 4, or will sell the patent reasonable. J. B. Boyce, Lockport, N. Y.

John Lamberty, mfr. telegraph and electrical instruments, experimental machs, models; fine gear cutting a specialty. 35 S. 5th st., Br'kl'n, E.D., N.Y.

Special tools and machines for mfg. designed and built to order; mechanical and Patent Office drawings. Weston & Smith, Syracuse, N. Y.

For Sale—A well established foundry and machine shop, including lots, buildings, machinery, patterns, and stock on hand, situated in Logan, Hocking Co., Ohio; will sell on easy and satisfactory terms; reason for selling—old age and ill health. Apply to R. Belt, Logan, Ohio.

M. Martin, manufacturer, P. O. Box 285, New Brunswick, N. J., will contract for the manufacture of articles in brass and other metals (stamped or turned), and dies and tools for making same; also patent novelties, electrical inventions, special machinery castings, etc.; estimates cheerfully given.

Alfred Dolge (Felt. Dept.), Dolgeville, N. Y., writes to T. R. Almond, 83 and 85 Washington st., Brooklyn, N. Y. "Your Almond Couplings are doing splendid work. I have used two for months, to the satisfaction of every one in my mills. Am putting up the third one now, and certainly give them the preference over beveled gears."

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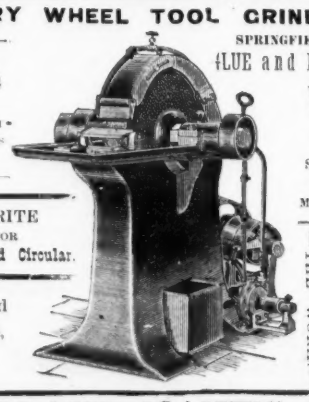

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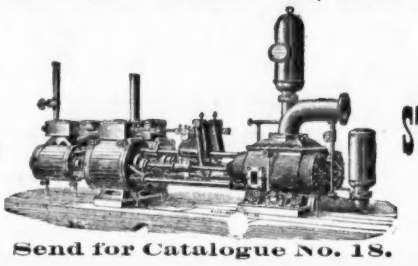

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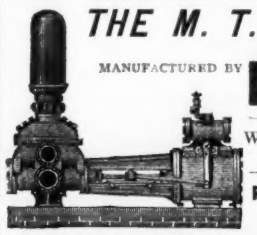

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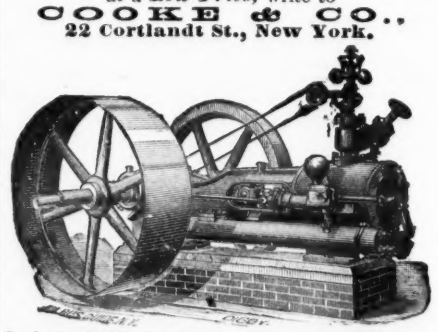

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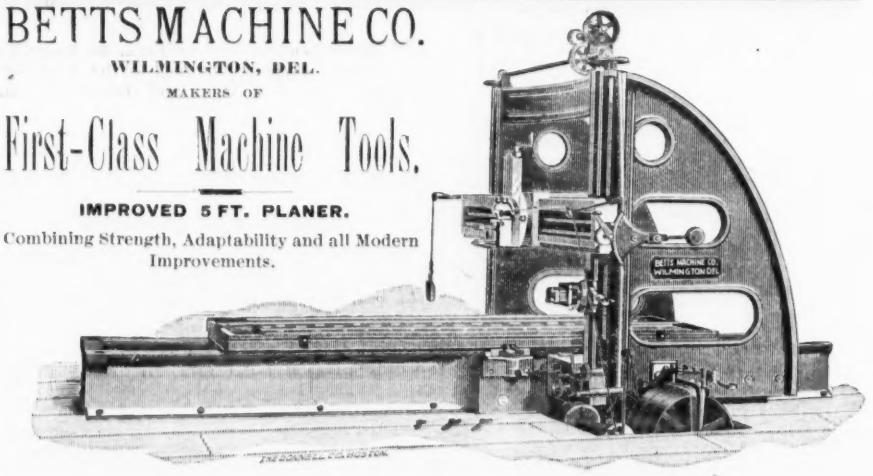

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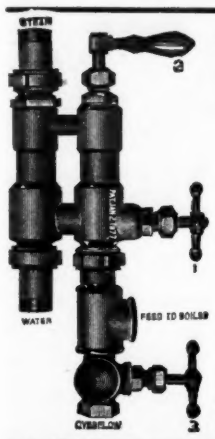

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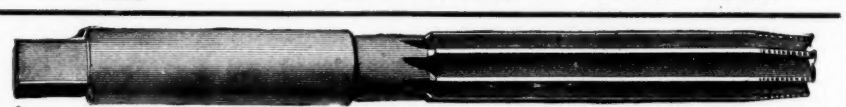

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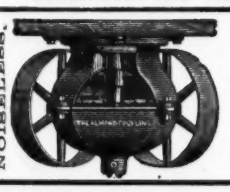

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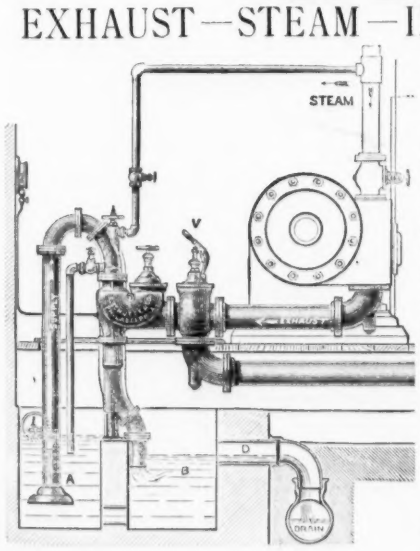

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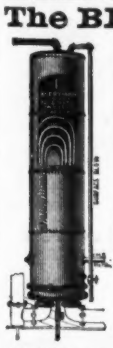

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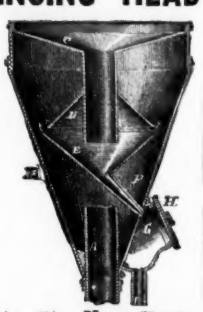

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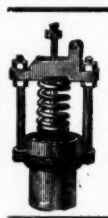

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12	2	1.30
13	2 1-4	1.35
14	2 1-2	1.45
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This Dog has a Very Heavy Base, so that if the thread wears, a Heavier Screw can be substituted.

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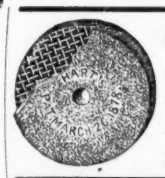

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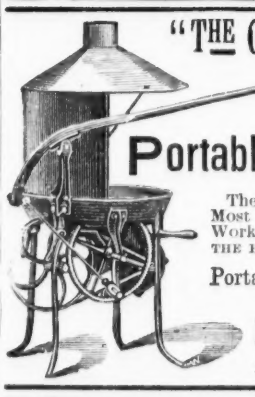

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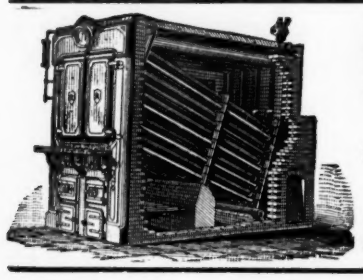

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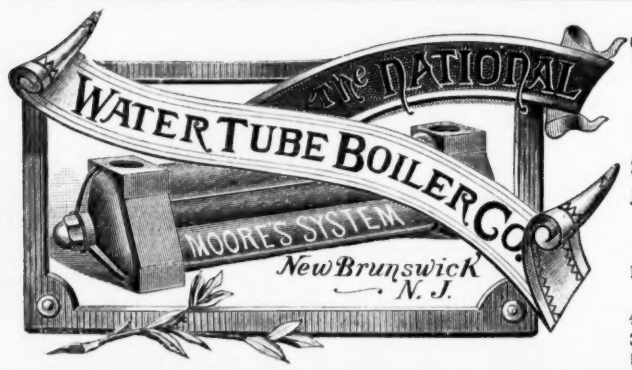

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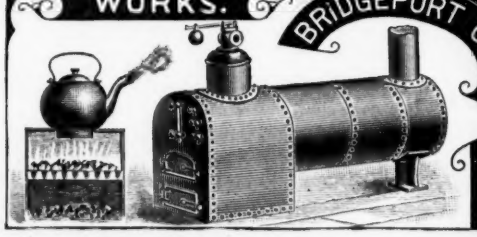

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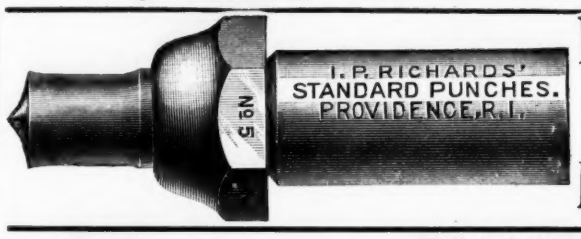

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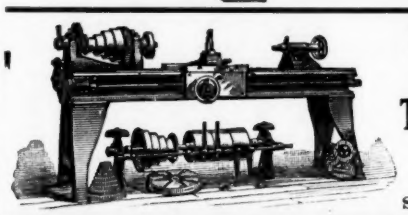

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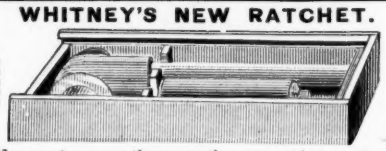
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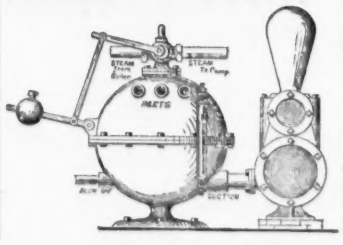

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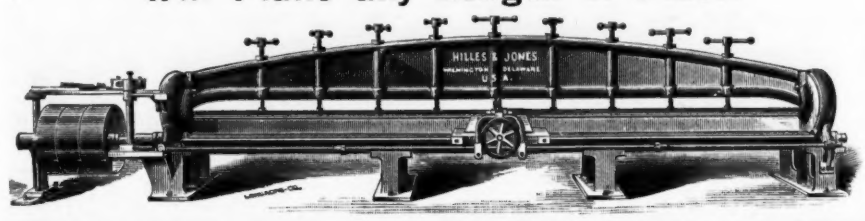

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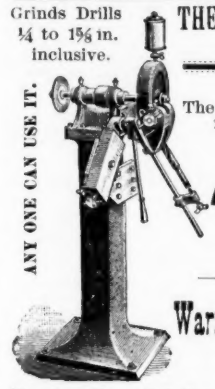

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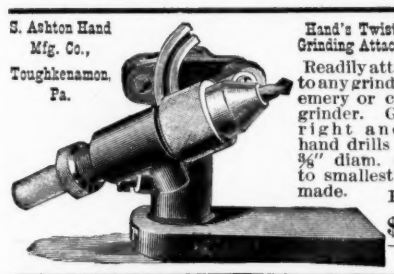

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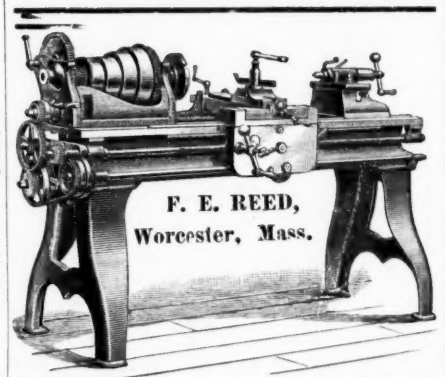

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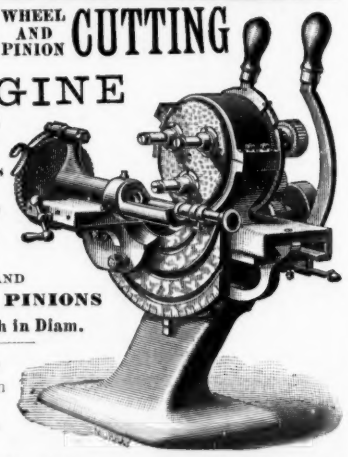

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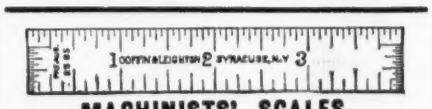

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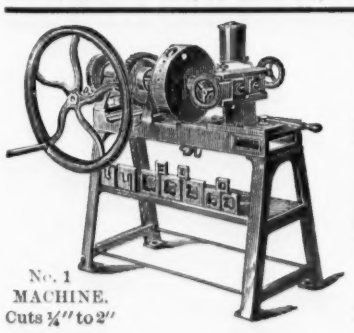

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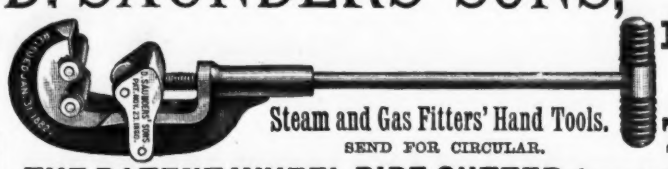

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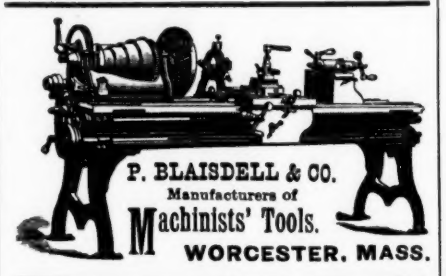

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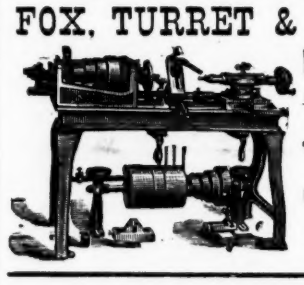

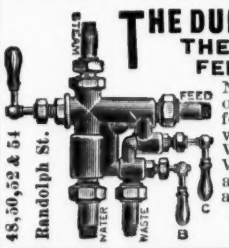

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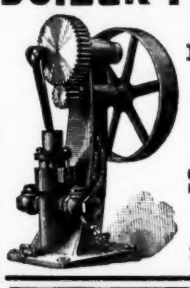

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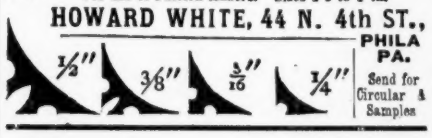

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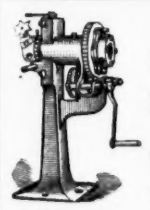

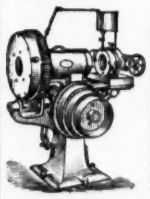

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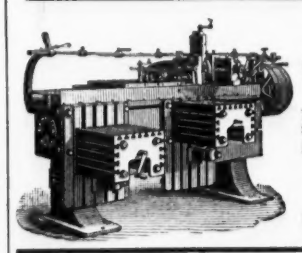

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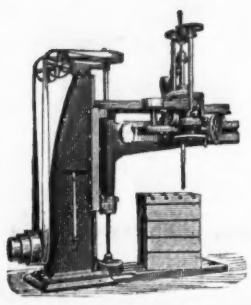

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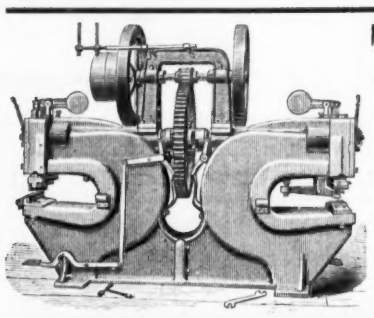

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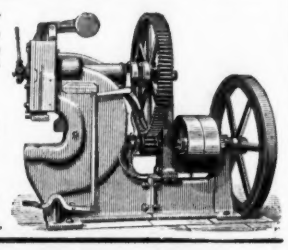

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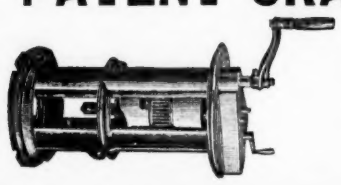

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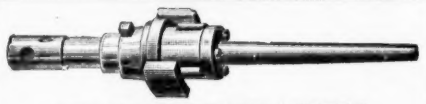

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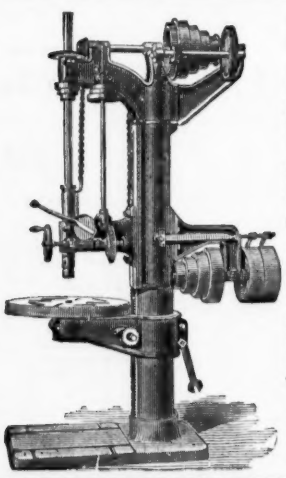

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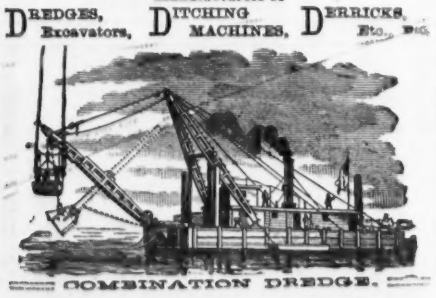

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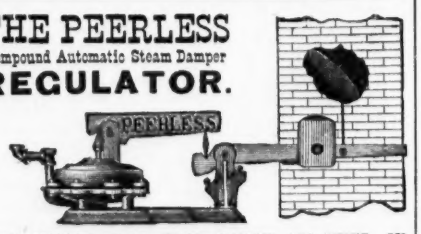

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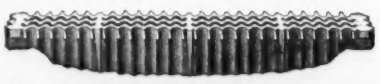

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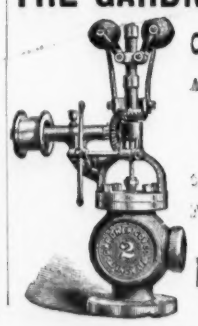

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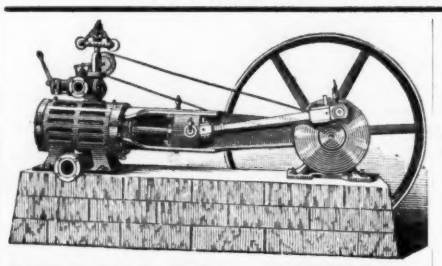

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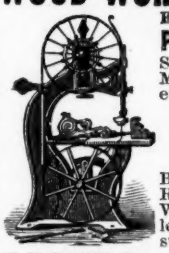

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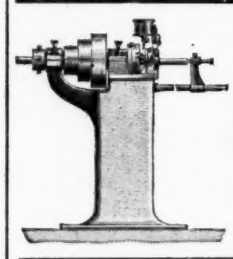

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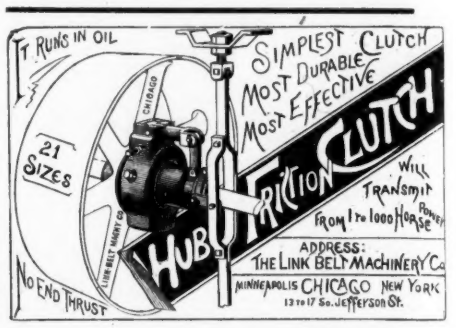

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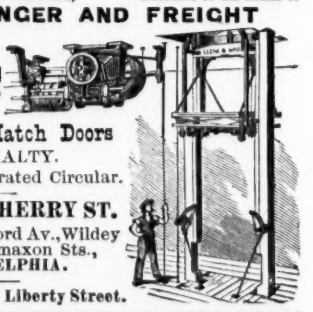

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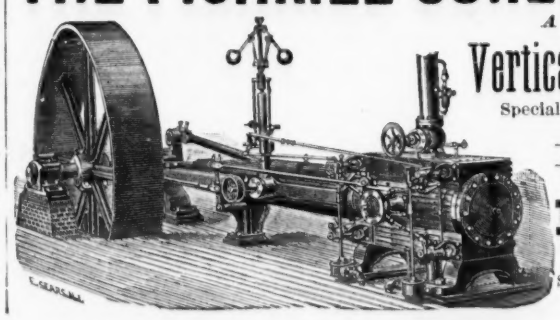

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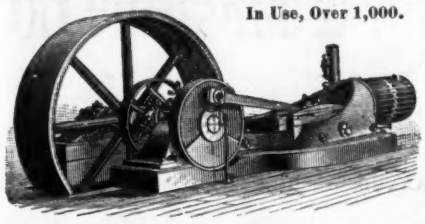

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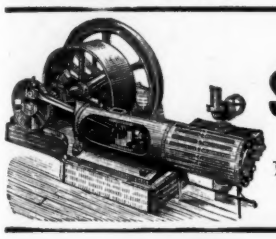

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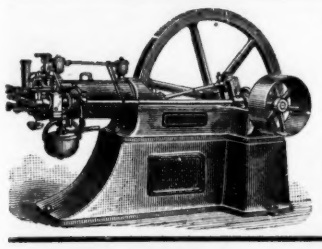

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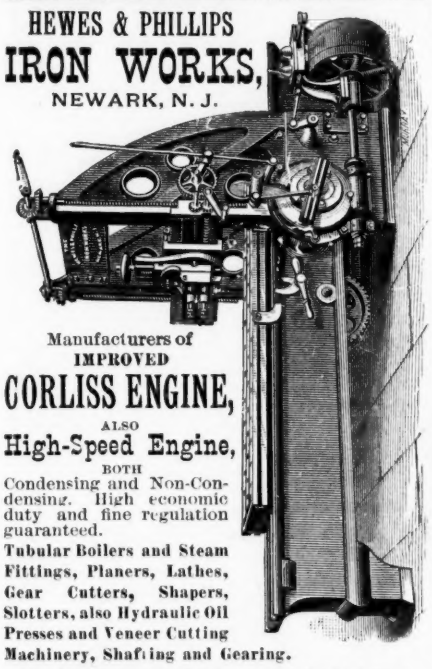

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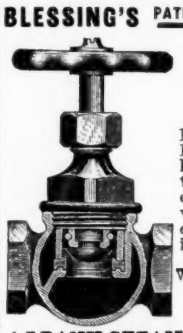

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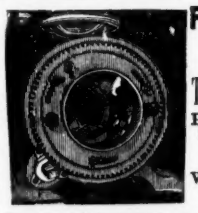

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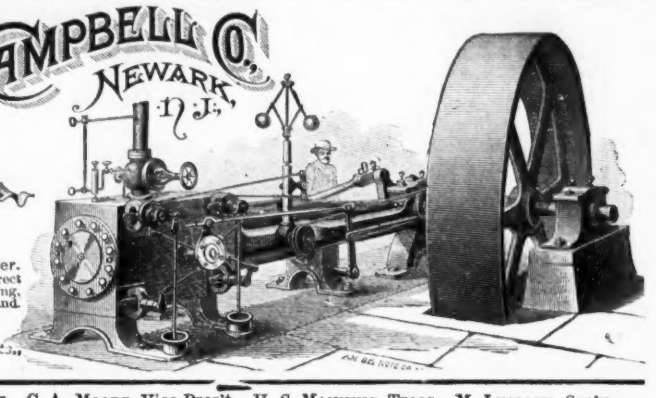

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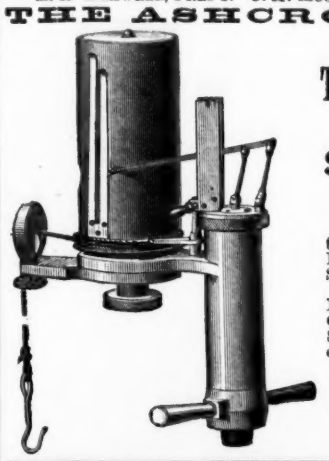

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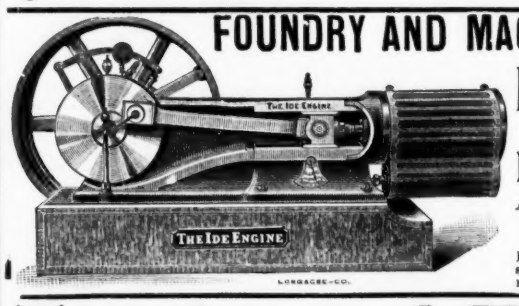

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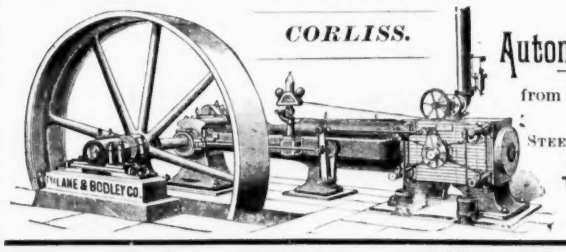

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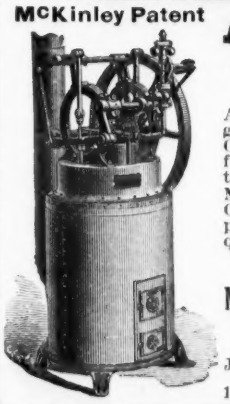

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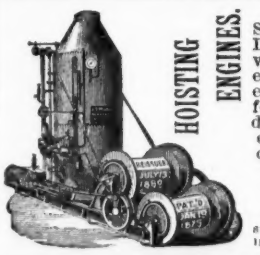

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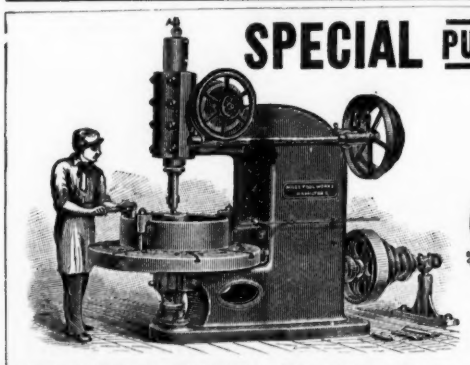

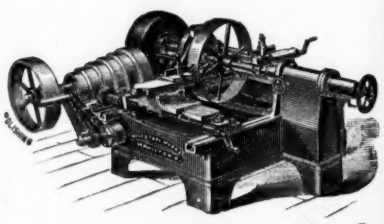

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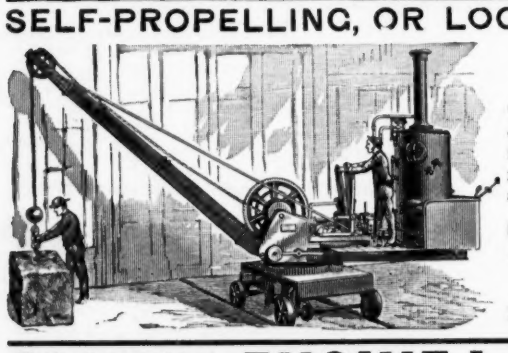

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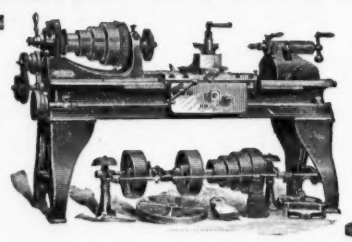

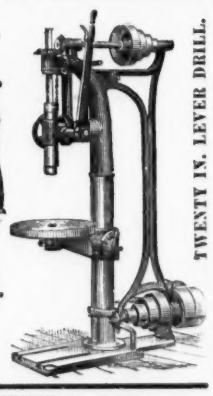

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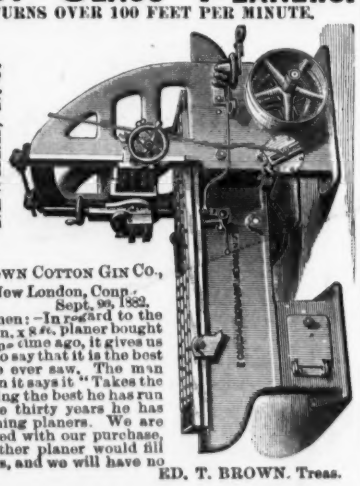

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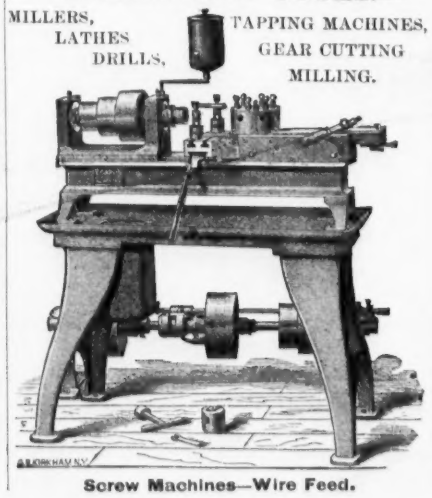

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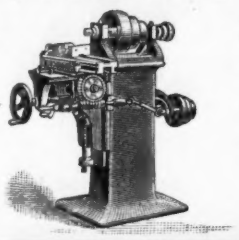

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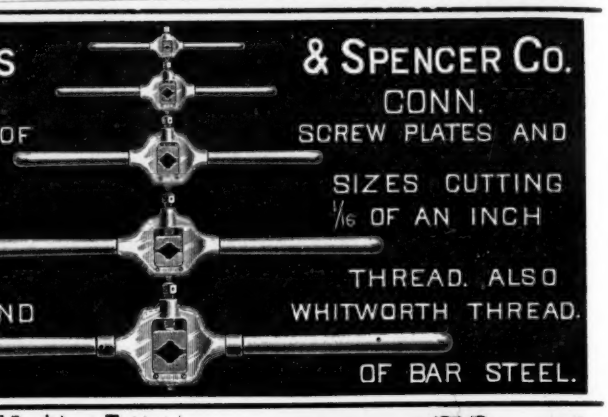

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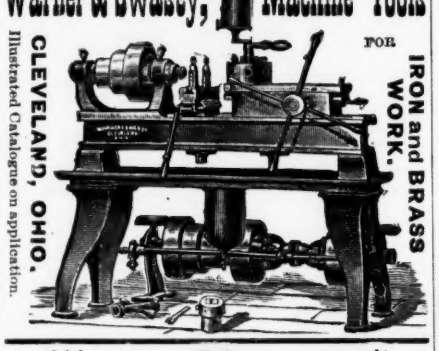

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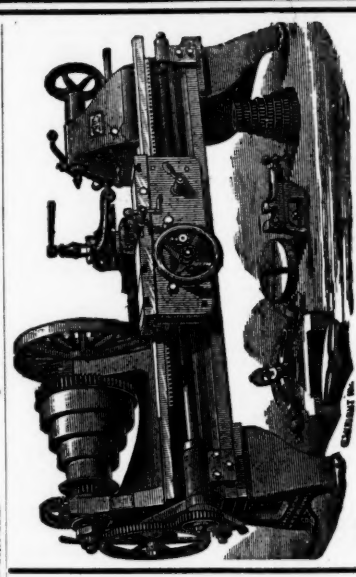

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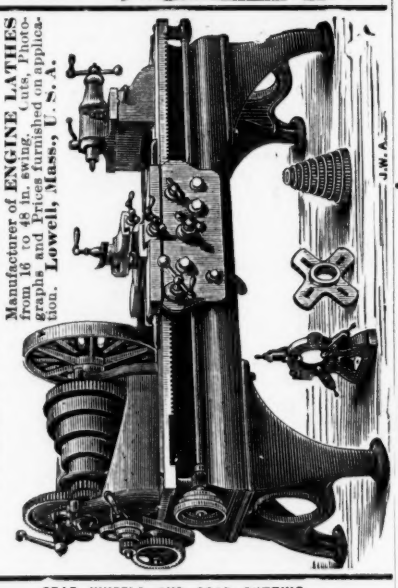

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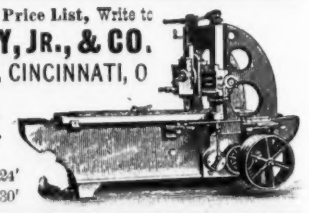

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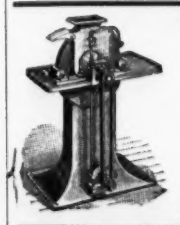

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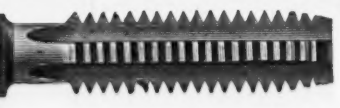

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